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*N. A. Wood*

# THE **C**ONDOR

A Magazine of Western  
Ornithology



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# THE CONDOR

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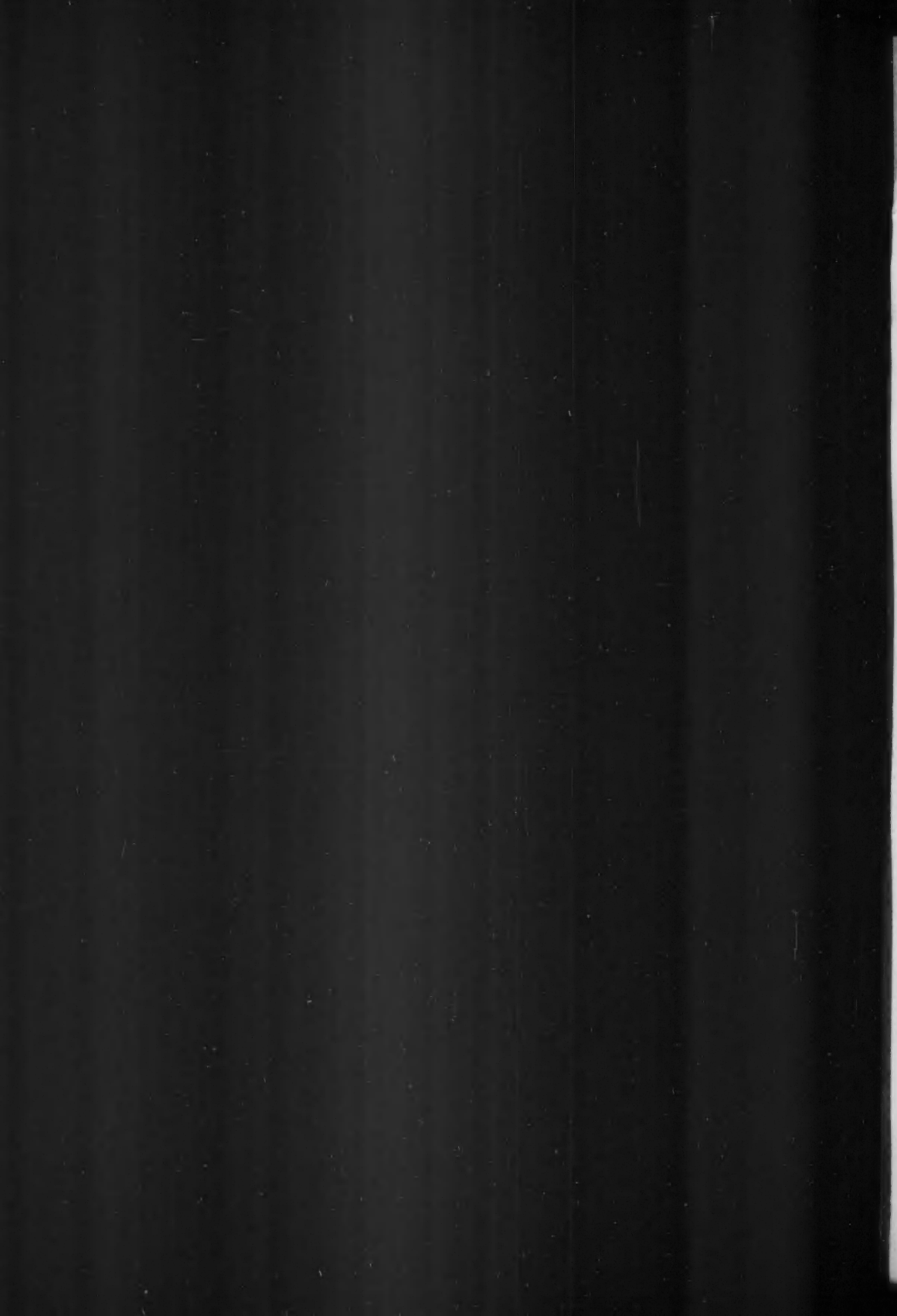
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# THE CONDOR

A BI-MONTHLY MAGAZINE OF  
WESTERN ORNITHOLOGY  
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MAY-JUNE, 1935

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## MOCKINGBIRDS, THEIR TERRITORIES AND INDIVIDUALITIES

WITH ONE ILLUSTRATION

By HAROLD MICHENER and JOSEPHINE R. MICHENER

### INTRODUCTION

This is a history of individual birds, of mated pairs and of the relationships between holders of adjacent territories and between these territory holders and the large floating population of the fall and winter. Our study covered the period from January 1, 1933, to February 15, 1934. All the observations on mockingbirds (*Mimus polyglottos leucopterus*) were made in the immediate vicinity of our home in Pasadena, California.

Now, having watched and recorded for more than a year, we feel that much still remains to be learned about the lives of our mockingbirds and how their behaviors correspond to those observed by other workers. Our own work, thus far, seems to have brought out as many differences as likenesses among the different individuals. The only record of observations closely paralleling ours that we have seen is the article by Mrs. F. C. Laskey on territory and mating of mockingbirds (*Migrant*, 4, 1933, pp. 29-35).

**Reason for use of colored bands.**—By the fall of 1932, after we had been operating our banding station for eight years, we were convinced that our trapping records were not giving us much information about the mockingbirds that frequented our region. It is true that a few came to our traps enough times that we learned something of them, but these birds were not sufficiently numerous to account for the number about us most of the time. In reporting on one of these birds which had been in our traps from one to three times during the spring and summer of each of eight successive years (and has since been trapped on May 11, 1933, making it then at least nine years old) we expressed the question in our minds in the following words:

What deductions in regard to this bird's life can be drawn from these records? Probably none with any assurance of approaching the truth, except that it was here during the mockingbirds' nesting season on from at least one to three days of each of the eight years. Did it nest on our station grounds? Did it nest in the near vicinity? Did it merely stop here on its annual movements? Does it have any annual movements? Why can we answer none of these questions? The traps have been operating almost continuously all these eight years. What could have been done eight years ago or since then to have obtained a more nearly complete life history of this bird? . . . . But how is one to know which bird to mark with a colored

band? Most of our mockingbirds did not come to our traps a second time and one of them was in our traps 262 times in two years (erroneously given as 298 before) . . . . It would have taken a very elaborate system of colored bands to mark distinctively each one of the 241 that have been banded during the eight years. (An Eight-year-old Mockingbird and Thoughts on the Use of Colored Bands, by Harold Michener: News from the Bird-Banders, W. B. B. A., 8, Jan., 1933, p. 8.)

Our interest in watching the mockingbirds come to the various feeding stations throughout the yard, especially in the past year, and the setting down of these thoughts, led us to the determination to mark them with colored bands.

**Method of using colored bands.**—Beginning in December, 1932, the few trapped up to early the following May were banded with a single colored celluloid band in addition to the numbered aluminum band. By the end of this experimental period we had concluded to follow the advice of Erickson and Boulton in the use of the same number of colored bands on each bird in order to avoid misidentification in case a bird should lose one or more bands. (Notes on the Use of Colored Celluloid Bands, by Mary M. Erickson: News from the Bird-Banders, W. B. B. A., 8, Jan., 1933, p. 9: A Program of Banding for Sight Identification, by Rudyerd Boulton: News from the Bird-Banders, W. B. B. A., 8, Apr., 1933, p. 20.) A total of four bands, three colored and one aluminum, with two on each leg, was chosen and a list of combinations prepared according to Boulton's formula which gives 671 combinations when five colors are used. Whenever a combination was used the number of the aluminum band on that bird was entered in this list, opposite that combination.

A few of the butt-joint size 2A colored bands furnished by the Biological Survey were used, and after that supply was exhausted nothing but size 2 spiral bands was used. These spiral bands were amply large when recoiled around the bird's leg with the original outer end on the inside. These sizes of celluloid bands correspond to sizes 2 and 1 respectively in the aluminum bands. Some of these were furnished by the Biological Survey but most of them were made by ourselves out of Ten Cent Store celluloid windmills. On comparing with Butts it appears that our method of making these bands follows his in a general way but with definite improvements, we believe. (A Study of the Chickadee and White-breasted Nuthatch by Means of Marked Individuals. Part I: Method of Marking Birds, by Wilbur K. Butts, Bird-Banding, 1, 1930, p. 149).

**Number of birds studied and relative numbers of adults and immatures.**—By the end of 1933 we had placed colored bands on 197 mockingbirds, 20 of which had been banded by us previously with the Biological Survey numbered aluminum bands. Nineteen were observed sufficiently to warrant special mention and 11 of these make up the really important characters of the mockingbird drama of the year which centered on our yard. For many of these birds the sight records became voluminous and could have been increased almost indefinitely by the simple expedient of looking more times and writing more records.

Of the 177 that were first banded during the year, 41 were adults and 136 were immatures. Counting the 20 adults which had been banded in previous years, there were 61 adults present and banded with colored bands during the year.

**Duration of stay of mockingbirds at our station.**—A study of the length of time that the various birds remained with us, based on the combined trapping and sight records, shows that 62 (17 ad. and 45 im.) were recorded on only one day; 8 immatures over a 2-day period; 13 (3 ad. and 10 im.) over a 5-day period; 8 immatures 7 days; 33 (4 ad. and 29 im.) 15 days; 23 (4 ad. and 19 im.) 1 month; 12 (9 ad. and 3 im.) 1½ months; 13 (5 ad. and 8 im.) 2 months; 5 (4 ad. and 1 im.) 3 months; 9 (6 ad. and 3 im.) 4 months; 2 (1 ad. and 1 im.) 5 months; 2

adults 6 months; 1 immature 7 months; 1 adult 9 months; 2 adults 10 months; 1 adult 11 months; and 2 adults 12 months.

This does not mean that there is a record for each bird on every day of the period stated but in most cases the records are such as to make it reasonably certain that the bird came frequently to our food supplies from the first to the last day of record. However, there are a few cases in which it is indicated clearly that the bird left our observational area and later returned. Of the 25 birds having record periods of three months or more, 13 were recorded in every month of their respective periods.

**Trapping records.**—We have prepared an analysis of our trapping records of mockingbirds covering the slightly more than nine years, November 2, 1924 to December 31, 1933, during which we have been banding birds. Since this paper is primarily a report of information on individual birds marked for sight identification this analysis of trapping records is presented as an appendix and is thus included to show, for this species, what has been learned by trapping alone and how little that is compared with what can be learned by observation of individuals marked with colored bands.

**Sex identification.**—We refer to our birds as males and females. It will be apparent that we have no positive proof of the sex of any of them since they are, in most cases, alive and wearing their bands. We have not yet recognized any sex indicators in the plumage although there is great variation in the amount of white in the wings and tail. We have used behavior characteristics to differentiate between the sexes and, although we wish to emphasize the fact that there are strong individualities in mockingbirds which might in certain cases make such differentiation incorrect, we do know that there are both sexes among our birds and we believe that the differences outlined below distinguish the sexes in the group we have had under observation. These differences are:

#### MALES

Hold and defend territories during the entire year.

Sing during spring and summer; stop during the molt, sing again during the fall gradually decreasing as winter advances.

Fight in defense of territory at all times of year except during the molting season.

Participate more freely in waves of sound that are heard during fall and winter.

Resent the invasion of male mockingbirds in spring and early summer but are more tolerant to females coming in at this time of the year.

Have a decided liking for high perches.

#### FEMALES

Hold and defend territories during fall and winter only.

Sing comparatively little and only in the fall and early winter.

Fight in defense of territory only in the fall and winter.

Participate less freely in waves of sound that are heard during the fall and winter.

Do not usually resent other mockingbirds coming in during spring and summer.

Rarely go on high perches during spring and summer.

Much quieter than the males during spring and summer and tend to be much more retiring.

**Description of the area under observation.**—Our banding station, at which this work was done, is situated within a mile of the center of Pasadena. The lot is 100 by 317 feet. There is a busy street one block east of us and we are surrounded by the city on all sides.

Near the center of the yard are three old eucalyptus trees and at the west end of the south side are three old grevilleas. To these we have added an informal collection of shrubbery and younger trees. No part of the ground has regular care.

It is rather a feral garden, the plants taking care of themselves in a large degree until necessity compels some vigorous pruning. Patches of thickly tangled shrubbery result with small open spaces between. The selection of plants has been governed to a large extent by the tastes of the birds. Water is available in many places. In five places fruit for the mockingbirds has been kept constantly for the last two years. This consists primarily of small seedless raisins at all times of the year supplemented by other fruits, such as cherries, grapes, persimmons and apples, in their seasons.

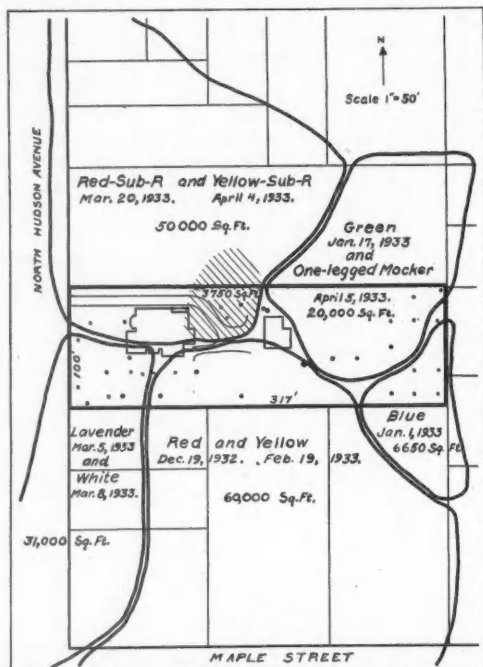


Fig. 23. Map of mockingbird territories showing approximate areas and dates on which territory holders were given colored bands. Shaded portion is winter territory of Yellow-Sub-R and later of AB-RG.

Surrounded, as we are by a city, our yard is nevertheless shut off from it. South of us are two bungalow courts which have their garages along our south fence making an almost continuous wall on that side for the extent of the courts while the remainder of the south side adjoins a vacant lot. Our west faces a quiet street lined with large elms. North of us is a lot the size of our own with a dwelling near its front. There are several trees on it and a large space of bare ground. The house is occupied, but the yard, one might say, is not. Our east adjoins the rear of deep lots which contain a number of trees. From the space back of our house we can see none of our neighbors and rarely hear them.

The total area under observation is approximately 400 by 600 feet.

**Boundaries and extent of territories.**—The boundaries of the territories touching our lot became apparent to us soon after placing colored bands on the owners of those territories. There were no noticeable minor changes in these boundaries but

there were some combinations of two, and even three, whole territories and some temporary transfers of ownership of appreciable portions of territories. All these changes cannot be shown well on a map so the map has been drawn to show in full lines the territories as we first knew them. From these and the descriptions, the changes can readily be visualized.

The territories occupied by the five mated pairs were of approximately the following areas in square feet: 60,000 (Red and Yellow), 50,000 (Red-Sub-R and Yellow-Sub-R), 50,000 (Barg and Blue), 31,000 (Lavender and White) and 26,650 (Green and the One-legged mocker). The winter territories occupied by the four lone females were of approximately the following areas in square feet; 26,650 (later reduced to 20,000) (Gabb); 3,750 (later increased to 11,000) (AB-RG); 6,650 (later increased to 26,650) (Blue); and 3,750 (Yellow-Sub-R).

#### HISTORY OF INDIVIDUAL BIRDS

We began our study on December 19, 1932 by placing a red band on the left leg of a mockingbird which was already wearing an aluminum band on the right leg. However, our sight records were not started until January 1, 1933. The trap records of this bird up to that time were as follows: banded as an adult, May 17, 1932 with aluminum band A283229; recaptured December 16, 18 (3 times), 19 (3 times), 20 (2 times), 21, 22, 24, 25 (2 times), 26 (4 times), 27 (4 times), 28, 30, 31. These records offer us only the information that this bird was in our yard in May and had been with us and using our traps for feeding places from December 16 on. One more thing we did know. These December captures were all in the same part of our yard.

Wearing a colored band we could now recognize him at sight and it soon became apparent that he did not go into every part of our yard but was repeatedly seen in one small portion of it. There were occasional exceptions to this which we shall discuss later. He lived in an area which apparently belonged to him. The part that extended into our yard was only a fraction of the total area but an important fraction because it contained a constantly replenished bowl of raisins and a water supply. In the months since then we have seen him almost every day, often many times a day, within our yard, on the radio poles of the adjoining courts, in the trees and on the parkings of the street south of us. His territory was determined by hundreds of observations of him. To us he is known as Red and we shall refer to him by that name in this paper. It was and is still a marvel to us that he lives his life in so restricted an area but it contains abundant food consisting of our raisins and fruits as well as crataegus berries, cascara berries, figs and small plums, ground that is watered and cultivated, shelter and nesting sites as well as high perches.

Our notes on Red during the last year fill many pages and include observations on his mating and nesting activities, the molting time and his winter habits. Indeed, we feel we know as much about him as we could know about any next door neighbor whose activities were one of our main interests in life.

Similarly, on January 1, 1933 we banded another mockingbird with a blue band on her left leg. This bird was captured at the east edge of our lot. She had been banded as an immature with aluminum band C103140 on July 21, 1932 and had repeated October 31; November 1, 8; December 4, 15, 16, 19 and 20. She will be called Blue.

Blue's territory was very small compared with Red's as will be seen on our map. This bird was so tame we rarely needed glasses to identify her and we saw her repeatedly. Her restricted territory lay almost wholly within our yard. In addition to the food we provided, her territory contained cotoneaster berries, elderberries and a tree of pearmain apples.

Another mockingbird occupied the territory immediately west of Blue's and extending beyond our lot to the north. This one came into our story on January 17, 1933 when he was given a green band on the left leg and christened Green. He had been banded with aluminum band B223633 on October 23, 1932 and had repeated December 9.

Gradually, as the result of many observations Green's territory was found to include the area shown on our map. It contains a persimmon tree, crataegus berries as well as peaches and apricots and we kept raisins at the faucet where Green drank.

The territory of another mockingbird extended into the southwest corner of our lot. We banded this bird with a lavender band on his left leg March 5, 1933. He had been first trapped and banded as A288770 on December 20, 1931 and had repeated on April 25, June 15 and December 12 in 1932. The part of Lavender's territory that extends into our yard is small. It contains a food table for our raisins and fruits, a toyon, a camphor tree, a eugenia tree, two bottle trees and a grevillea. All of these trees furnished food for Lavender and there are several small pools in this part of the yard.

Although we now had four mockingbirds wearing colored bands there was one whose territory extended into our yard. This was a very quarrelsome bird who drove all the others from the food shelf at our kitchen window. He also guarded a bush of crataegus berries that was near the northeast corner of our house. We knew him as the window mocker for a long time before he was trapped on March 20, 1933. He was already banded on his right leg with an aluminum band, numbered 582178, which had been placed there by us on July 19, 1929. He was an adult at that time and was now, therefore, at least five years old. We put a red band below the aluminum one on his right leg and we named him Red-Sub-R. He had previously been recaptured on April 24 and on April 26, 1930. His territory is outlined upon our map. He has been trapped only these four times and prior to placing the colored band on him we know little of his history. Since March 20, 1933 he is very prominent in our notes and we see him frequently. In addition to our raisins and the crataegus previously referred to he eats cotoneaster berries, feijoa petals and persimmons from the trees and shrubs in that part of his territory within our yard. In the lot next door a date palm and a mulberry tree lie in his holding. He drinks from a small pool in our front yard and can doubtless obtain water in the yard north of us.

These five were our first mockingbirds marked with colored bands. The year 1933 proved to be by far our most successful in trapping mockingbirds. This was doubtless due in part to our constant food supply for them during both 1932 and 1933 but we think it was an exceptionally good year for mockingbirds from the reports of other bird observers in the vicinity.

We have gone somewhat ahead of our story to present the map of the territories of these birds. We would like to state that the major outlines of the territories were established early in the progress of the work.

We shall now return to the beginning of the year and give the history of our work with the hope that we may, in a measure, develop our account as it was unfolded to us.

**January.**—Beginning on January 1, 1933, every time one of these birds was identified by its bands we recorded its location, its activities, its reactions to other mockingbirds and to us. In fact, we recorded everything concerning it that seemed of interest.

During January all five of the mockingbirds whose territories we have described were, we believe, in our yard. But only Red, Green and Blue are in our records



for they were the only ones wearing colored bands. During this month none of our birds was heard to sing. Red and Green with the other neighboring mockingbirds often entered into the waves of mockingbird notes that seemed to spread out from a center in all directions. Any one of them might start this, giving a few chips or occasionally a loud, harsh squawk or several well separated chips. Then the others would answer in any one of these ways. Generally this would last only a short time and might occur a varying number of times each day, depending, we believe, on the number of times unwanted mockingbird visitors appeared, for this was always, so far as we know, the cause of the disturbance.

The appearance of these visiting birds was at first a puzzle to us. With our own so confined to the restricted limits of their territories why were others wanderers? We believe these visitors during the winter were in search of food. They were often in small groups and were obviously hungry. By our planting of food plants and by our constant supply of raisins and fruit we made it possible for our territory-holding mockingbirds to stay within the limits of their territories. During the winter months some sources of food must become exhausted and the mockingbirds relying on them must be forced out. When this happens they doubtless wander far, for our birds were constantly on the alert for them and drove them off viciously, while the harsh calls and chips warned other mockingbirds in the vicinity of the presence of the intruders.

We noticed even at this time the very distinct individualities of different birds. Red was not especially tame but neither was he frightened when we approached to watch him. He spent much time in our yard and we could find him practically every day in our walnut tree above his raisin bowl or in the shrubbery near it. Many of his actions we recorded at that time without any interpretation of them and as we reread our early notes we find he was often giving the sharp, harsh note that means invaders and that was answered by all the others or was an answer to their calls, that he often sat where he could look at the food we placed for him or that he was sitting quietly in rather secluded shrubs. By the end of January we had seen him in many parts of his territory and for the following year its limits were not in any way changed. He showed for a short time a curious liking for our traps and from December 16 to February 12 he was caught 42 times. It was not necessary for him to enter the traps for food because the same food was always plentiful outside. Suddenly he ceased to enter them except at rare and widely separated intervals.

During January, Blue was more often in our records than either of the other birds. This was due to her extreme tameness as well as her small territory. She was very quiet. During this month we heard her answer other mockingbirds only once. Often when we went to look for her we would find her sitting on some low perch apparently watching us. Between December 4, 1932 and January 22, 1933 Blue entered our traps nine times. Our notes refer repeatedly to her tameness and to her habit of apparently coming to watch us at times and for this reason we became much attached to her and felt very strongly that accident had befallen her when our records for her ended suddenly on January 30. In this surmise we were quite wrong.

Green was given his colored band on January 17, 1933 and during the remainder of the month we identified him many times but learned little about him. One of our notes refers to him as always silent and always hiding. He doubtless evaded us many times. He was, in our opinion, excessively timid and during January we were not able to get very close to him. He was trapped only once during the month.

**February.**—Blue was gone and February opened with only two of the mockingbirds in our yard wearing colored bands. We never learned where Blue went when she left us on January 30 and on February 1 we found Green occupying her



territory as well as his own. There had been no hostility apparent between them and we do not believe Green drove her out although at first we were inclined to think this possible.

Green now became a prominent figure in his territory. He was seen singing for the first time on February 1, and from this date he sang with increasing frequency. Until the middle of the month his songs were not very loud and were usually sung from low perches. After this time they became much louder and more varied. They were often given from some tree top and he frequently flew, singing from one high perch to another. There were several of these perches from which he sang and after the middle of the month almost every note on him records singing. On February 22 after a large flock of robins had been in our yard all day we heard Green give a fairly exact imitation of a robin's notes.

During February we noticed a great change in his attitude toward us. On February 4 our notes say he was almost as tame as Red. By February 20 he would come to us and hunt earth worms when we were digging. He seemed almost fearless and was from this date on, except for his future mate, our tamest mockingbird.

The day after we first heard Green singing we found Red singing softly in his territory. Like Green, during early February, his songs were soft and like Green also, about the middle of the month he began to sing louder and from higher perches. We described some of his first songs as whisper-songs. Then we sometimes heard the soft, faint song with bursts of louder song and by the middle of the month he was singing on a high radio pole in the court nearest to our house.

On February 16 an unbanded mockingbird appeared in Red's territory. Her breast was unusually dark when she first came—perhaps darkened by smoke from smudging—but it was so unusually dark that we were able to recognize her at sight. On February 19 we caught her and banded her with aluminum band C103226 on her right leg and a yellow band on her left leg and she became known as Yellow.

Red showed no hostility to this bird which we almost immediately concluded was a female. Several times he chased her a few feet but it was quite unlike fighting. She as well as the other females we have watched were quiet at this time of year. They did no singing and took no part in fights between the males. They tended to stay lower in the shrubbery and were more retiring. We very soon realized that she stayed in Red's territory except on rare occasions. If Red left his territory and went into that of another bird he was immediately chased out by the owner of the territory into which he went. If Yellow went into the territory of another bird she was chased a little but really allowed to remain. It was quite unlike the reaction that ensued if a male bird were the intruder.

During the first week of Yellow's presence she and Red were frequently seen sitting together in a shrub or low tree—Red two or three feet above Yellow. Although at other times of the year they frequently sat in this manner it was more conspicuous during the first week. At such times they were usually entirely quiet.

When Yellow came Red's singing decreased although it did not stop. When he was singing Yellow was not near him. His song had not reached the stage that we described for Green at this time—singing loudly as he flew from one high perch to another, or jumping into the air as he sang. Now he sang even less than he had before Yellow came.

At this time we first heard a soft little *hew, hew* repeated many times from the low parts of the shrubbery where both Red and Yellow were sitting. Although this sound is not entirely confined to the spring we have never heard it except from a pair of birds together. By the end of February we were sure that these two were mates and Yellow remained quite as strictly within their territory as Red.

**March.**—We have said Red's singing decreased after Yellow came. However, he still sang during the first half of March but after that his singing practically ceased and he was frequently seen going into one of the courts south of us. At this time also we noticed his anxiety about the California Jays (*Aphelocoma californica californica*). One of these jays was lame and so recognizable to us. It was frequently seen sitting near a mockingbird. When the mockingbird would fly the jay would follow and again sit near him. At such times Red sometimes made a noise we had not heard before from him. It resembled the *hew-hew* given when a pair of mockingbirds are together but was louder and had a worried quality. We afterwards heard this noise when Red's baby was in our hands and we concluded it indicated anxiety although at such times other mockingbirds commonly expressed anxiety by another note. We particularly watched Red's actions in regard to jays and although at this time we did not see him chase them he showed he was worried when one was near, if not by his notes by his movements. We believe that by their watchfulness the jays learn the vicinity of the mockingbird's nest and that in most such cases at least some of the eggs or young fall victims to the jays.

From the time Red's song ceased so suddenly about March 13 we had few records for Yellow until the end of the month, and we saw her rarely with Red during this time so that March ended with both Red and Yellow rather inconspicuous in our surveys.

As to Green in March, we are quite unable to describe his song adequately. He was frequently seen at the tip of the cypress in our back yard singing, flying up and singing again, singing on the wing from perch to perch. Our notes for the month are full of such remarks as the following: "Identified ten times today—singing always." "Singing almost all day." "Singing all morning." Such records occur for every day and we can never forget the melody in our back yard during those days. Several times when Yellow was near the border between the territories of Red and Green, Green was seen to come near Yellow singing his best continually and even to enter Red's territory. At such times Red wasted no effort in song but growled viciously and attacked Green sending him immediately to his own territory. Green was at this time one of our great delights. He almost seemed to come to hunt us when we went into his territory and our notes on him are voluminous. When we went into the back yard with raisins we often held a few out to him, then put them down and he went at once to eat them although they were never absent from his food tray. At the end of March his song was still flooding our yard all day and every day.

The plot now thickens a little. On March 5 we trapped and banded Lavender. For some time before he was actually banded with the colored band we had known that a bird occupied his territory and we were glad to have him labeled so that we could identify him positively at sight. Before this time we had heard him singing considerably. At some time between the time that Yellow came into Red's territory (February 16) and the date when he was given his lavender band (March 5), his singing decreased presumably because a female had come in, for at the time he received his colored band we knew there was an unbanded mockingbird in his territory. On March 8, she was banded as C103227 and given also a white band and we called her White. We knew less about this pair of mockingbirds than about any other pair in our yard. The lavender and the white bands proved to be difficult to see. Both birds were also excessively timid and only a small part of their territory was in our yard. Both, when approached, would immediately fly some distance and, if possible, get on the opposite side of a limb or trunk of a tree from the observer. After they were banded Lavender was seen singing a number of times but he did not sing steadily as he had earlier in the year.

There are three bottle trees in the territory of Lavender and White. The seeds of these are dry, hard, and covered with stiff prickly hairs. We were surprised to see Lavender and White eating these seeds, not once, but several times. Once, one of them was observed to eject from its mouth, one of these seeds and on examination the seed was found to have the outer, thin, dry papery layer and the hairs removed. This pair of mockingbirds was seen many times when no records could be made because they were so persistently evasive that we could not positively identify their colored bands.

Even before January we had noticed a mockingbird, wearing an aluminum band but no colored band, guarding the food on a window shelf at the northeast corner of our house. He drove away any bird that came there to eat. It was not until March 20 that he was captured and a red band placed below the aluminum band on his right leg and he was named Red-Sub-R. He had watched over a crataegus near the corner of the house all winter with the same diligence with which he had guarded the window shelf, but by the time he was banded with the colored band he no longer drove off any birds other than mockingbirds. He had been singing during February and continued through March but he never sang as constantly as Green. None of his singing perches were in our yard but the chimney of the house north of us and two deodars north of that were favorite places with him. We could see all of these perches and could identify him on the chimney but only with difficulty on the deodars.

By March 29 another mockingbird had come into Red-Sub-R's territory. This bird already wore an aluminum band. And now Red-Sub-R's singing decreased rather sharply just as Red's had done when his mate arrived. Both Red-Sub-R and his mate were very suspicious of us. They never ate when we were near and never came to the window shelf if they could see us. This was so noticeable that we rearranged the food placing the raisins and fruit upon the ground where the birds would not see us so easily.

**April.**—We now began April with three of our territory-holding mockingbirds having mates. By using a very large cage with no treadle and making a rapid run to close its door we succeeded in trapping Red-Sub-R's mate on April 4. Her aluminum band bore the number A261627 and we put a yellow band beneath it and called her Yellow-Sub-R. She had been originally banded August 8, 1930 as an immature. She had repeated December 29, 1930 and December 22, 1931 so we had captured her only three times previous to the time when she was banded with the yellow band. It will be noted that both she and Red-Sub-R were rather old birds although she was at least two years younger than he. This may account for their caution which is a noticeable characteristic in both of them.

Yellow-Sub-R had a habit of lifting her wings very often. This is a common action of mockingbirds but Yellow-Sub-R did it so frequently that it was often possible to guess her identity correctly by observing this mannerism. We have watched this habit of lifting the wings a great deal in three baby mockingbirds reared by us at different times. We found with all of these babies that any new or strange object put into the cage caused this action. When released we observed one of them going about the yard lifting its wings over and over as it looked at eucalyptus caps, pebbles and all sorts of objects. This certainly was not an indication of fear because when afraid they behaved very differently. We can only describe their actions when alarmed by saying they went wild. This was a reaction caused in one of them by going near it with a coat with large fur cuffs. With one of them a blue glass marble caused this same response. Whenever it was shown to him he seemed to lose all self-control and we could never tell why. As long as we kept him he retained his fear of the small sphere of blue glass.

To digress still further from our topic we would like to tell here that one of these babies always recognized the voice of the person who fed him and would begin to beg for food as soon as he heard it. One member of the family often teased this baby by scratching on the screen door of his cage. The little mockingbird would fly at the finger going up and down and make a queer scolding noise and fluff up his feathers. After being released he remained in our yard for some time and when the teaser appeared the young bird would fly near him with fluffed up feathers making the noise he had made when the door of his cage was scratched.

To return to Yellow-Sub-R, there is rather little to say of her April activities except that she often came for food. Like Yellow she was quiet and retiring *at this time*. In the light of knowledge of Yellow-Sub-R later in the year we use italics.

During April, Red-Sub-R and Yellow-Sub-R behaved much as Red and Yellow had behaved during February. They were observed sitting quietly in the shrubbery and Red-Sub-R was at such times apt to be above Yellow-Sub-R and he was seen to chase her for a few feet sometimes. Our opportunities for observing this pair were not especially good at this time of the year for they spent little time in our yard.

The story of Red and Yellow for April is very different from that of Red-Sub-R and Yellow-Sub-R. It will be recalled that Red's singing had decreased during March. In April there are no records of any song from him until April 13. This was not, however, because he was not seen, for he was a prominent figure in our yard during April. He was seen often in the tree above his raisin bowl and if his supply became exhausted he was apt to go to Red-Sub-R's from which he was promptly chased by Red-Sub-R. This tendency to visit the other food shelf was temporary and ceased before the end of April.

Red and Green continued to behave as they had in March. Green often approached the part of the territory where Yellow was and was as often forced to return to his own territory by the ever-watchful Red.

During April, Red's jay problem became acute. Beginning about April 8 he was often seen chasing jays when they entered his territory. He would give a harsh growl-like cry and follow them till they left. But at other times they followed him and we felt sure it was difficult for him to visit his nest unseen by them.

In addition to guarding Yellow from Green's attentions and keeping jays from his nest, other mockingbirds gave him much trouble. Even when one was flying over and quite obviously going past Red's territory he would fly up to a considerable height to meet it and speed it on its way. He spent much time sitting on high perches from which he would immediately fly to meet the approach of either a jay or a mockingbird.

On April 8, about the date when he was first seen chasing jays so diligently, young mockingbirds were heard in the more easterly of the courts south of us and this offered an immediate explanation of the scarcity of records we had for Yellow and of Red's failure to sing during the latter part of March. On this same day Yellow was seen carrying an earth worm in the direction of these babies. At this time the young were evidently in the nest for in the few days that followed the sound always came from the same location. On April 12 we heard them at some distance from the original location.

To show how extremely busy Red was at this time we insert here a note made at 7:00 a. m. on the morning of April 13.

Red growled at and chased a jay from the immediate vicinity of his young. Then he chased another mockingbird into the south eucalyptus. Green came into the eucalyptus and Red growled at him. The strange mockingbird flew north and Green

returned to his territory. Red flew to one of the radio poles in the court. A jay then came to the south eucalyptus tree and then went to the walnut. Red drove him out of the walnut to the north eucalyptus then followed and drove him from it. Red flew to the walnut, went down and ate a raisin and flew again to the radio pole in the court. A jay came to the south eucalyptus. Red drove him out, then flew to the east grevillea tree to drive out another jay and again to the radio pole. A moment later a jay flew from the maple trees on the street south of us to our eucalyptus at quite a high elevation. Red flew up to meet him and chased him past our lot and then went to our walnut tree. A jay now flew from our grevillea trees to the maple trees on the street south. Red followed and drove him on. Every time he chased one of these birds he made a growl-like noise.

The end of such notes marks the limits of our time rather than of Red's activities.

But on the day the preceding note was made Red flew to the radio pole and sang for the first time heard since March 29, and after this his song increased as the need of fighting jays decreased. There are few records of him following jays after April 16 when the young one (for only one was reared) was probably too large to be longer of interest to them.

Because of the appearance of the young one at this time we shall carry on the account of Red beyond the month of April in order that we may connect it, without any break, with what we saw of the baby.

During the remainder of April, Red was seen almost daily caring for the baby. He was often seen to feed it raisins and often it was with him near the bowl where the raisins were kept. In all cases our mockingbird parents brought the young to the food supply before the young were able to eat alone and we have no records of young birds being kept from the food by adults for more than a brief moment while an adult took food himself and in no such case was a parent the one to demand such precedence.

Red's troubles in early May concerned other mockingbirds rather than jays. The immature birds were not yet about and all adults were regarded with suspicion. There are repeated records of his hostility to all of them that entered his domain. On May 7 and 8 a particularly prolonged fight occurred. It started when an unbanded mockingbird appeared in the northwest portion of Red's territory and gave every evidence of intending to remain and establish a territory of his own. He sang from low in the shrubbery and Red immediately responded by pursuing him. Instead of leaving Red's territory as a mockingbird with a territory of its own would have done, in all probability, this bird flew around and around in Red's territory. As soon as he had eluded Red by hiding low in some bush, he began again to sing but always a very faint song and always from a low, thick, leafy hiding place. As soon as he began to sing Red was after him. Sometimes in the heat of pursuit Red went beyond the limits of his own territory but always returned immediately. This fighting recurred over and over on May 7 and on the morning of May 8 Red was too busy chasing the intruder to start a song of his own. At noon he was heard singing in the top of a small tree. In a trap below this tree was the intruder. He was banded with both aluminum and colored bands. As soon as he was released Red went promptly after him and possibly the trap experience helped turn the tide of battle in Red's favor for the newly banded mockingbird disappeared from our yard and records.

The scarcity of notes on Yellow during the last of March continued till April 10. After that she was often seen. She was observed carrying insects. Once she had a large moth in her bill as she sat in the walnut tree. A jay sat watching her. She gave little worried chips and moved nervously about. We chased off the jay with rocks and she went immediately in the direction of her nest. Like Red, she carried

raisins away and it seemed to us she took a larger share of the actual care of the baby than Red whose efforts went largely to the protection of his nest and territory.

This baby was seen for the first time on April 15. He was 250 feet from the nest and was seen to fly about three feet. His tail appeared to be about an inch long and both Red and Yellow were with him. After this time he was frequently seen in different parts of Red's territory. His ability to fly increased daily and we often watched him beg for food and saw both parents feed him. On April 24 we recorded his tail as between one-half and three-fourths the length of that of an adult. On April 25 we caught him by running him down. A rain had made his feathers wet and hindered his still weak flight or we could not have captured him in this way. He was banded as B223660 on his right leg and both a red and yellow band were put on the left leg. We were now able to identify him without his parents. On May 6 we watched a curious performance on the part of this baby. He was in a grevillea tree and was twice seen to carry a dead grevillea leaf to a crotch of the tree where he placed each leaf and then appeared to tramp on it. On May 7 we saw Red feed him. On May 8 we heard him begging for food with tiresome frequency. This was the day Red was so unusually busy with the intruding mockingbird. On the 9th we suspected the baby was feeding himself and we never saw him fed after this date. It was, therefore, just a month after the time we first heard him that he ceased to beg for food. On May 15 he was seen eating raisins, quivering his wings at each bite but making no noise. On May 16 he was seen at the southeast corner of our lot in Green's territory, well outside of Red's territory. He was not molested by Green, and indeed we found the young are rarely chased by any adults. This was the last time we ever saw him. We use the masculine pronoun merely for convenience.

Yellow's activities after the middle of April will be described later.

We now return to an account of Green for April. During the first four days of the month he sang almost without stopping. On April 5 he was seen several times with a one-legged mockingbird. We immediately guessed her identity because she wore a band. This was later verified when we caught her. She had been banded on April 25, 1929. She had returned January 25, 1932 and was found in a badly crippled condition. After operating to the best of our ability on a wounded leg she was released unbanded but recaptured on January 28 and again banded as A288773 and was not again seen until 1933.

She had been seen at various places in our yard and in the vicinity earlier in the year. On February 2 she had been in Green's territory. On March 22, 27 and 31 she was in Red's territory and we thought her a female because Red did not molest her. She seemed to go where she pleased. On April 3 she was with an unbanded mockingbird in Green's territory. Green watched them but did not molest them. On April 5 this bird and Green were seen several times together and from this time they were obviously mates. Both were very tame. The one-legged mockingbird was repeatedly found within a few feet of us when we worked in Green's territory and when we were digging the two were almost at our feet.

Like Red and Yellow during February, Green and the one-legged mockingbird were frequently seen sitting silently close together and Green's singing decreased suddenly and greatly after April 5. He still sang but the song was of an entirely different quality, softer, given from lower perches and rarely given during flight.

Green and his mate were seen very often. We looked for them at every trip to our bird traps and rarely failed to find them. They were an appealing pair to us. As we passed a shrub where they sat we often held out a few raisins and then put them down. Both would immediately go to eat them. Green entered a trap on one occasion. On being released he began to sing in flight when a few feet from us and



perching in a bush very near continued his song. Once the one-legged mockingbird was given a mole-cricket. Green came and stood near while she ate it but made no attempt to take it.

All our territory holders now had mates and it is of interest to us that each pair had its own personality. The two birds in a pair behaved similarly. We do not wish to say this is always true but it was so in these four pairs of mockingbirds. Red-Sub-R and Yellow-Sub-R were suspicious of us and very cautious. Lavender and White were so timid it was difficult to observe them. Green and the one-legged mockingbird were extremely tame. Red and Yellow lacked any such distinguishing trait. They would go for food if we were near but not if we were too near. They neither avoided us nor seemed to have any interest in us.

The ability of Lavender and White to avoid us is evident from the few records we have of them for April. Both were often seen but we wrote no records unless we actually saw their colored bands and this was often difficult to do. Lavender sang during this month but we cannot say how steadily. On April 25 White appeared in our yard with a small baby. She was identified only four times during the month and Lavender only six. We never saw the baby again and never saw White after April 28 and later Lavender appeared with another mate but we do not know the story of this pair.

During April one additional mockingbird was given colored bands. It was trapped April 28. It disappeared from our records after this for several months.

May.—Although we have endeavored to tell the story of our mockingbirds month by month we carried the April account of Red on to May 16 because it was then the baby of Red and Yellow left his home territory. We also discontinued the account of Yellow on April 16 because she was then showing signs of renewed nest building. On this date Yellow was seen carrying nesting material to the south edge of their territory where we later knew she had a nest. On the 19th, however, she was twice seen taking care of her first baby and did so afterwards. On the 20th she and Red were seen sitting together and we heard the soft *hew-hew* notes that we had heard from them in February. After this we scarcely saw Yellow for a few days. On the 29th she was seen sitting near Red and after May 6 she was back in our records every day. She was seen on May 17 carrying food and on May 27 was with Red hunting for food on the lawn of one of the courts facing the street south of us while young were heard squeaking in a small Italian cypress tree close to one of the bungalows. Our records of her are too meager for us to know the exact history of her family affairs. We leave her now at the end of May busy with the single young one of her second successful nest of the season.

The account of Red has been previously carried to May 16. From that date until May 25 there are records of song from him and of his diligence in driving out other mockingbirds. He was, during this time, busy with his second brood of young which were at some distance from our lot and we now report the successful invasion of Red's territory at the time when his family cares were too heavy for him to defend the distant edges of his domain.

On May 25 at 9:00 a. m. a mockingbird was heard singing low in the walnut tree above Red's raisin bowl. Red himself was in a nearby tree looking intently in the direction of the sound. He went immediately to the walnut and chased out the singer and then went to his high perch on a near radio pole where he sang for some time. At 10:15 the same thing happened again. After this Red took a position on a high perch in a eucalyptus tree overlooking the walnut tree. At 11:30 the episode was repeated. At 1:10 a spotted towhee scratched vigorously among the dry leaves under the walnut near the raisin bowl making a considerable noise. Red came instantly



but left immediately without disturbing the towhee. Just after this the intruder came to the walnut tree but before he could sing a note Red chased him out. At 1:30 the new mockingbird was seen by us hiding low in an old fig tree overgrown with a cascara. He was quite tame and we watched him looking at the raisins in a trap in the fig tree. Once he sang a few faint notes which Red, singing loudly himself, apparently failed to hear. The next day the new bird continued to sing in Red's territory. It was an easily recognized song of a few faint notes with little variation and always from low, leafy hiding places. The song would stop as if the bird were listening and then start again. As soon as Red heard the song he would come and hunt out the intruder who always flew but just as regularly returned. His method was different from that of the bird we recorded in early May as attempting to gain a foothold in Red's territory. That bird would fly on Red's approach but keep going around and around within the limits of Red's territory. This bird would immediately leave and remain outside till Red was quieted and then would return.

On May 27 we banded the intruder as C103313 and with the color combination AR-RB for now we were using three colored bands and one aluminum band on each mockingbird. This formula means that Red-Blue, for so we named him, wore an aluminum band with a red one below it on his right leg and a red band with a blue one below it on his left leg. Much as it must have troubled Red he was not able to dislodge Red-Blue. Red was never excluded from this part of the territory. Red-Blue simply stayed in it also and Red arrived with a fierce growl every time he came to the raisin supply. We shall tell more of their behavior in June.

By May 31 Red's second baby was out of the nest. Red was extremely busy again. He was seen chasing jays and he helped procure food and sang his claim to his territory more often than he had with the first brood. This may have been on account of the persistent Red-Blue.

The records of Red-Sub-R and Yellow-Sub-R for May seem to center about their food shelf. They were both there regularly and often. Yellow-Sub-R was seen frequently on some large rocks in the yard north of us where she frequently stood raising her wings over her back and apparently looking down into the grass. Sometimes she would jump down and apparently obtain food. Red-Sub-R never frequented these rocks. He was often singing on the chimney of the house north of us. His song often contained a perfect reproduction of the squeaking notes of a baby mockingbird. Red-Sub-R had battles of his own. He successfully drove out Red-Blue who, however, was much more interested in Red's territory. In the southeast corner of Red-Sub-R's territory is a feijoa tree. The mockingbirds are extremely fond of the sweet petals of its flowers and strange mockingbirds began drifting in to eat them. At first Red-Sub-R drove each one out but it was soon clear to us, and apparently to him, that he could not keep them out. These were not territory seekers. They came only for food. They ate and left.

The young mockingbirds in the feijoa were the first young of the year to visit us. We saw no evidence of the adult territory holders trying to drive them out. They wandered at will through our yard. Four of these young ones stayed together for several days. We later concluded this did not mean they were of one brood because we frequently could see that the members of such a group were of different ages. They seem to want the companionship of other young mockingbirds and they go about in small groups sometimes, probably, a family but not always. Most of these visiting mockingbirds returned only for food and none of them figures prominently in the rest of our story.

Lavender was seen driving intruders from his territory during May; he was observed watching a fight between other mockingbirds and he came to the feijoa for

petals and returned immediately to his own territory when he had eaten. We have no records of song from him during May. Only a small portion of his territory was in our yard and therefore we do not wish to say he did no singing but we do not believe he sang much. White, Lavender's mate, was last seen during April. On May 6 another mockingbird was banded as C103261 and given a green band above the aluminum one on her right leg. From this time this bird was a rather regular visitor at our kitchen window shelf. She came from and went toward Lavender's territory. We did not then suspect she was Lavender's mate but our June records indicate that she was. We called her Green-Super-R to distinguish her from Green.

It will be remembered that Green's singing had decreased during the latter part of April and that he and the one-legged mockingbird were mates. During the first five days of May, Green continued to sing a little and his mate was not seen. She, we believed, was building a nest. On May 5 we suddenly faced one of the disappointments of this new and intimate knowledge of our birds. Near a tree where she had often come to get the raisins we held out to her was a little pile of feathers and the band of the one-legged mockingbird. A cat had killed her and Green was left without his mate. Almost immediately he began to sing incessantly as he had done before she came and this continued with scarcely a break for four days. On the fifth day he sang only a little and after that not at all. He was absolutely quiet and very tame and would come immediately for the food we held out to him. On May 15, ten days after his mate was killed, he disappeared until June 2 when he was seen eating from his raisin dish. On this occasion he was tame as usual and perfectly quiet. He went through the shrubbery and flew off to the south and we have never seen him since. The uncompleted nest of Green and the one-legged mockingbird, just a rough but shaped platform, has remained in a small spiny acacia ever since to remind us of them. It was probably made during the first five days of May while the one-legged mockingbird was so inconspicuous and is, as far as we know, the only mockingbird nest built on our lot during 1933.

We now introduce a new bird. On May 17, two days after Green left his territory, an unbanded mockingbird appeared and began to sing. At first he was rather quiet but after a few days he had taken complete possession and was singing on all the high perches Green had used. But for our bands we would most certainly have concluded that Green had again started to sing, so identical were their actions. On May 23 we banded this bird with aluminum band C103302 on his right leg and a yellow band below it and on his left leg a yellow band with a green one below it. Thus his symbol was AY-YG and we manufactured the name Yellow-Green for him. He was promptly and completely at home. He visited Red-Sub-R's feijoa for petals; he went to Red's walnut and was sent instantly home. He sang all day and every day and we thought at night as well. He seemed to delight in all the well-known antics of mockingbirds—flying up from his high perch and singing as he flew from tree to tree and filling the days with song as Green had done and as Red and Red-Sub-R had not done at all during the spring. We believe this was not an individual difference but that it was due to the fact that Red and Red-Sub-R almost immediately acquired mates. We never saw Yellow-Green fight other mockingbirds that went through his territory and we saw no possible mate lingering in his vicinity, and May closed with his song almost obliterating other sounds in his territory. Through June this constant song persisted. During very hot days he sang less; on the return of cooler days his song was renewed. Other mockingbirds could enter his territory, eat his food and sing there, but his song went on. He was, like our other mockingbirds, fond of the honey in grevillea blossoms and while they were in bloom his face was yellow from their pollen. At one time when a mockingbird, presumably a female,

with a brood of young entered our yard Yellow-Green left his own territory to follow her. She paid no attention to him and he soon returned. During the first four days of July he continued to sing but we noted that his song was decreasing. After July 4 he was never seen in his territory but on July 11 he was seen eating with the numerous mockingbirds that came to us for food at that time. Our belief is that having failed to attract a mate he abandoned his territory and the attempt and we reluctantly read not excessive joy but something approaching despair in the mockingbird songs that seem most thrilling. No other mockingbird took possession of this territory until fall and after Yellow-Green left, it was a quiet spot. Only young birds of the year and adults coming for food were there and no song was heard in it.

It will be remembered we left Red at the end of May struggling with the intruding Red-Blue and caring for his second baby of the season. The presence of Red-Blue in Red's territory led to a peculiar situation. Red now chased Red-Blue only at times. At other times he allowed Red-Blue to sing unmolested for a considerable period. Red-Blue always sang from low in the trees or in bushes but the longer he stayed the higher he went to sing. Both Red and Red-Blue chased out other mockingbirds. Red-Blue never chased Red; Red chased Red-Blue intermittently. Red could and did go, without trouble, into the corner where Red-Blue lived. We never saw Red-Blue attempt to enter the other part of Red's territory. Red-Blue never, therefore, really owned this small part of Red's territory and he won no mate in it. He was last seen singing on June 13 having been in it 19 days. He was again seen on August 4 preening himself. He had doubtless come for food like the many others that came then.

**June.**—We never caught Red's second baby and it was last heard on June 8. Red sang during the entire month of June spending much time on radio poles and other high perches. He quite certainly sang more during June than at any time since February. He came often for raisins, even when we were near, and preferred the raisins to the seedless grapes and cherries for which the other mockingbirds showed such preference. Like the others he was much quieter on hot days.

Yellow's appearances during June were few and practically every record is merely a statement that she was getting raisins. She was more timid than Red when we were near. She was very quiet. There is no record of a sound from her during the month.

We have many pages of notes on the Sub-R's for June. It was their busy month. Until June 22, most of these are merely that they were getting raisins. On June 17 Red-Sub-R was seen to drive a cat out of his territory. It first took refuge under a house and when it came out he followed it till it was beyond his border. Early in the morning of June 23 Red-Sub-R and Yellow-Sub-R brought a baby mockingbird to our yard. When we went into the part of the yard they claimed, they made a great fuss. On our approach Yellow-Sub-R swallowed an insect she was carrying and both parents came very close to us scolding and chipping. They would take no food to the baby while we were in the yard. We had to go inside and watch through a window to ascertain its whereabouts. At least one of the parents was always on guard on an overhead wire. In changing places the one coming would fly toward this perch growling slightly and the one on the wire would leave. As soon as one of us approached the location of the baby the bird on guard would chip. The other parent would immediately come and both would scold at us. A little later in the day Red-Sub-R was singing on various high perches and Yellow Sub-R was near the baby. If we went near it while he was singing Yellow-Sub-R would begin to scold and Red-Sub-R would stop singing and come to help her.

At about nine o'clock that morning we caught and banded the baby. It was

still too young to escape us when we knew its position. Both parents came close to us, scolding and chipping and making queer gurgling noises. This gurgling note is the one usually given by the parent mockingbird when the young are in danger. Red was an exception to this. The baby (there was but one) was banded as C103390 and given the color combination RY-AY. As long as we knew him we called him only "the Sub-R's baby." During the afternoon the baby was in a tree exactly opposite a window. The adults would feed him five or six times in the same number of minutes. Then he was fed nothing for nearly an hour when he was fed several times again and then made to wait an hour for more food. Sometimes, if a parent came near between these meals, the baby would squeak a little but he was not fed and he begged very little all day. All that day and early the next morning one of the adult birds was on guard. Probably on the 25th and certainly by the 26th the baby had been moved to the north side of the house north of us. On the days that followed the parents were seen carrying food over that house to the baby and June ended with both of them closely occupied with its care. We think we saw no other mockingbird parents quite as capable as Red-Sub-R and Yellow-Sub-R.

It will be remembered that Lavender's first mate, White, had disappeared and that a mockingbird banded as Green-Super-R had been seen in his territory but not definitely associated with him. On June 6 Lavender scolded us when we took two young mockingbirds from a trap. These were both quite well grown. They were not his babies, however, for the next day he and Green-Super-R were in his territory caring for a much younger baby which he was repeatedly seen to feed and which he protected. We knew less of the domestic affairs of Lavender than of any of our other territory holders, but we know that during the summer of 1933 he had two nests and that one young bird grew up from each.

We may pause here to survey the results of the other nests of the summer. Of the birds we have studied Green lost his mate and left, and no young ones were reared. Yellow-Green obtained no mate, Red and Yellow raised two babies from two nests, Red-Sub-R and Yellow-Sub-R reared but one baby that summer, and Lavender with two different mates reared two young. Red-Blue did not obtain a mate while holding a territory in our yard but we do not know positively that he, Yellow-Green and Green did not later claim territory elsewhere, find mates and rear young although in our opinion it is extremely doubtful. We do know that the three pairs we could follow produced only five young birds for the summer of 1933.

There were many visiting mockingbirds present in our yard in June. We have previously spoken of the numbers that came for feijoa petals. This influx of adult visitors for food and of immatures that stayed with us for a longer or shorter time assumed interesting proportions. We placed food in two places easily seen from the house. This consisted of cherries, which we found the most attractive thing we could offer, and later, when these were gone, we used seedless grapes. The traps, in which we captured many of these visitors, were placed near these piles of fruit and baited with the same fruit but the supplies outside the traps were never allowed to become exhausted. With glasses we could easily identify visitors wearing colored bands. During June, 42 mockingbirds other than ones holding territories within our yard were caught and banded with aluminum and colored bands or were seen, already wearing the colored bands given them in May. Of these 25 were adults and 17 were immatures. Many of them were seen only a few times.

In the case of our territory holders we noticed that the parents did not leave their young nor did they drive them out. The immature birds left home quite soon after they were able to feed themselves. Groups of young, often perhaps the young of a brood, but sometimes certainly not of the same brood for we knew their approx-

imate ages, would appear in our yard, stay for a few days and then move on perhaps to reappear singly or in the same groups later. During the early summer the young apparently wandered with no aim other than food. They were unmolested by our territory holders although they might be driven from the food momentarily by either an adult or another young bird.

There were a few that stayed long enough or visited us often enough to be of more than passing interest. A288779 was an adult given colored bands during May. She was here occasionally during May and the first week in June. On June 26 she came with three babies keeping them in our yard all morning near the food. She was seen to feed them several times. The next day she brought them again. We would see them flying back and forth between our yard and the yard east of us which was quite likely their home territory. On June 29 she was still feeding them and was seen without them on June 30. We insert this one record of what was a common occurrence—adults bringing their young to our yard to feed them. The immatures were apparently brought to the food supply. When they were able to eat they stayed near it or wandered as they chose. We believe that by the end of June there is some decline in the strong instinct of the territory holders to drive out invaders. They are less inclined to fight and there are at this time almost no birds establishing territories. It is perhaps the first hint of the approach of the most peaceful season, the molting period. One adult that came to our yard for food on June 13 was banded and on June 24 was seen, apparently in its own territory, about a quarter of a mile south of us. A number of these adults came from some distance, flying high and making a straight line to our yard. They dropped down, ate, carried food away, rising high in the air and going over, rather than through, territories. They never lingered and were here only on legitimate business. No greater contrast to these birds could be found than Red-Blue who, stealing in under cover and singing as much as he dared, staying, although repeatedly driven out, was quite truly a disturber of the peace. One young bird banded on June 13 as C103376 and given the color combination GA-BB later became an important figure in our yard. We refer to her here only because she was then first in our records and we name her in this place, Gabb. She was again in our yard on June 28 and 29.

**July.**—We now come to July and find Red-Sub-R and Yellow-Sub-R still caring for their one baby. They kept him on the north side of the lot next to us, where he had been taken from our yard, until July 4. Red-Sub-R came frequently and carried off raisins and cherries in the direction of his baby. Yellow-Sub-R seemed to come less frequently but Red-Sub-R's habit of singing a few notes from the roof just above the raisin dish before he dropped down to the food may account for our greater number of records for him because, hearing the song, we always looked to see him. Many other mockingbirds were now eating at this food tray. He did not attempt to drive them away as he had done during the winter but we felt this brief song on the roof above them was his notice of ownership. At this time he began to sing often on a deodar in the lot north of us. After July 4, about twelve days after it left the nest, the baby was flying quite well and it traveled to all parts of Red-Sub-R's territory although we did not see it beyond these limits. As it grew older the parents seemed to give it a little intentional neglect in regard to food and between July 4 and July 14 it seemed constantly begging for food at our back door. It would sit where it could see the raisins and cherries and beg. Red-Sub-R often sang while it was doing this. Sometimes he would stop suddenly, feed it several times and then apparently allow it to go unfed for a long time. At different times on July 14, both Red-Sub-R and Yellow-Sub-R were seen to bring the baby to the food at our window. Yellow-Sub-R was particularly interesting at this time. She came with

the baby, both flying along our driveway just above the ground. The baby came to the raisins but Yellow-Sub-R only paused and went on into the shrubbery near, staying on the ground. The baby squeaked once or twice and did not seem to know quite how to proceed but after a moment or two ate a cherry. His mother then turned and the two went away together. This was the first time he was seen to eat alone and the last time he was seen with his parents. On July 17 he was found in a trap quite outside of his home territory. Another young mockingbird was near and doubtless the two were going about together but they were certainly not of the same brood. The next day he was in a trap in Red-Sub-R's territory. This was the last time he was seen.

Red-Sub-R continued to sing during the rest of July and also to give the short song on the chimney or edge of the roof before he came for food. Yellow-Sub-R was seen rather seldom. Both she and Red-Sub-R became as suspicious of us as at first, now that the pressing need for food was over, and if we were in sight they would not come for it.

During July the records for Red and Yellow were few compared with earlier months. Their family cares for the year were over. Red was not singing, to our knowledge, except for one record on July 15. We do not know that he would have stopped normally at this time. In some way he hurt his right foot during the early part of July. We never knew what happened to it, but it was permanently crippled so that it is now quite useless except as a prop. This was a severe injury and may have been the reason for his silence and our scanty records. However, we may have failed to see him when he came for raisins, for we left his raisin bowl where it had always been but the cherries and grapes were in another place and our attention was so focused on the birds visiting this fruit that we probably failed to get some records of Red. We later noticed that he preferred the raisins to the other fruit. After we observed Red's injured foot we watched him anxiously, fearing a broken leg or a thread or hair wound about the foot. When he was at last trapped and examined, the trouble appeared to be confined to the foot, which was much swollen and quite useless with the toes turned under. We do not know whether it was due to disease or injury, but we were glad it was not in any way due to our bands.

Yellow was so rarely seen during July that we at times wondered if she had left.

Lavender, too, was not seen very frequently during July. His mate was never seen after June 24. Every record of Lavender during July reports him eating grapes, which he evidently preferred to raisins. We did not hear him sing at all.

The thought was now often in our minds that the real work of the year was over. In these days preceding the molt there is an indifference toward all other mockingbirds beginning to appear. The difficulty of watching our territory holders was increased by something approaching lassitude on their part. They came for food and left again but with the exception of Red-Sub-R there was little song during July. We do not mean to imply that all mockingbirds reach this stage at the same time for some certainly nest later than any of those directly under our observation did, but doubtless many that sang earlier were now, like Red and Lavender, almost silent.

However, our observations on these territory holders were prevented to a large degree by the ever increasing numbers of visiting mockingbirds coming to the food in our yard. We identified all that we had the time and good fortune to see sufficiently well, if banded, and we trapped and banded many others. Often while we watched one, others were here but not identified. One hundred and forty-seven mockingbirds in addition to our territory holders were identified in our yard during July. Doubtless many of the unbanded ones we saw failed to enter our traps but we feel that most that came with any regularity probably were trapped. Of the 147 which were



recognized one had been given its colored bands in April, 11 during May, 24 during June and the remaining 111 during July. Some previously had been banded with aluminum bands. Thirty of the 147 were adults, 117 were immatures.

It will be remembered that our territory-holders had ceased to object to other mockingbirds that came for food but did not stay and that the young had wandered at will at all times. In July there were no real fights. Occasionally a bird would drive another away from the food for a brief moment. Usually they showed an inclination to come singly to the food but often two, three or even four were eating at the same time and if possible most of them, especially the young ones, carried food away from the trays to eat it. It seemed to us that now the feeling of ownership of the territory holders was almost completely broken down although they remained within the limits of their territories. There were no conflicts. Again we comment on the individuality of mockingbirds. Another observer told us at this same time of a particular mockingbird still assiduously driving from its food supply not only other mockingbirds but all other birds that came near. Even had our own birds been inclined to keep out these visitors they could hardly have faced successfully the hordes that crowded to the food. Perhaps had conditions not been made so attractive to the intruders our birds would have been more apt to defend their rights but we saw no inclination on their part to drive out the mockingbirds, young or old, that came in during July.

While the adults sang little in July this was the month when we first heard the immatures' song and this was regularly heard after the middle of the month. Some were singing before they began to molt but in most cases the plumage of these baby singers was beginning to look worn. They continued to sing during and after the molt. This baby singing was given from low, thick shrubbery and they were very shy and would stop immediately when we went near. It was a faint, soft song quite without imitations of other bird songs but distinctly a mockingbird song. Some of them, usually the poorer singers and therefore presumably the beginners, quivered their wings while singing. They seemed absorbed in the production of the song and would sing on several days in the same place and then disappear. We repeatedly noticed that they sang most at noontime. Later they went higher to sing but never to a tree top or high perch and it was always the same soft, faint song. We also often observed other young mockingbirds near the singer giving every appearance of listening. Hunting these young singers was one of our late summer pastimes and we saw many of them, some with the dotted breast of the immatures and others that had molted. In the latter case both the character of the song and our record of the colored bands told us it was a young bird singing.

A few of the visiting mockingbirds were recorded often enough to have some interest to us as individuals. C103429 was an immature banded July 15 and was recorded frequently until August 10. This young bird sang the baby song in the same place for several days and would sing for almost an hour at a time.

Another interesting young bird was one that was much paler in coloring than is normal. Its bill and feet were pale gray and its feathers so much lighter than those of the others that it was quite conspicuous. Its iris was the normal gray of the immature mockingbird. Both parents were with it and both were normal in color. One of them comes into our story later.

Sometimes there were brief quarrels between the young birds. If two arrived at the food at the same moment they might eat quite peaceably together, or one might run at the other or fly a few feet in his direction. One would then retreat and wait till the other left before returning to eat. Occasionally they would fight and then go to the tray and eat together. The efforts of one baby to eat cherries on a sloping roof were laughable.



One pair of parents brought a brood of three to our food dishes. All were new to us. The parents approached the food first and both began lifting their wings repeatedly before coming quite up to the tray. From the window we watched all three babies begin lifting their wings as soon as the parents began doing it.

One adult came sometimes in May and June for food. When leaving, this bird always flew high above the trees and flew south for at least more than a city block. We never found its territory. On July 2 it brought a baby with it which it fed and it then flew away carrying food. On July 11 it was seen with a baby younger than the one seen on July 2 and was seen to feed it. We make no attempt to explain this. This bird continued to come until August. We often compared its cautious behavior in coming to the food and in eating with the care-free attitude of the young birds.

An immature banded on June 20 was with us so constantly for so long that we gave it a special name. It was C103387 and its color combination was YB-AY. We devised for it the name Ibby. After July 11, Ibby was here all the time apparently and seemed to be always in the lower branches of a walnut tree above the food where it ate. We came to regard it as a resident of our lot and this bird and Gabb referred to in June, were quite certainly residents, in a sense, during the late summer. Other young birds came and went but these two remained a much longer time. Gabb seemed to be gone for ten days during July but aside from that absence we knew her for many months.

Another immature banded July 14 remained with us until July 19. It was then absent till the 26th and was recorded four times on the 27th. The next day it was found dead a mile north of us at 2:00 p. m. just twenty-four hours after our last record of it. This indicates that these young birds travel about at this time of year, and our belief is that at about this time and during the succeeding weeks they are seeking their winter territories. Quite evidently that was what Ibby and Gabb were doing, as we think later records will show. The period when the adults are molting is the time, we believe, when the immatures are making their first efforts to hold territories and they can, at this period of the year, practice this with impunity even within the territory of an adult although they will probably be asked to move on with the approach of autumn.

**August.**—August was the quietest month of the year. We heard no song nor, indeed, notes of any kind, from our adult mockingbirds. They were rarely seen moving about the yard. There was no fighting and they were seen only occasionally coming silently for food which disappeared from our trays very slowly. Our territory holders sat with fluffed-up feathers. Their plumage was worn and ragged. Our first record of a molting adult was August 8. Some of the older immatures were in new plumage before the adults began to molt. But the molt did not seem to affect the actions or song of these young birds. Our adults had completed the molt by September 16. The last bird seen in immature plumage was observed on October 8—but this was some weeks after the next to the last was seen. Thus the adults molted at a comparatively definite time of the year while the immatures, apparently, molted at a more or less definite age and not all at the same time.

Some years ago a young baby mockingbird was brought to us in late August with the report that it was orphaned. We reared it. It molted during the last of September and early October but did not molt its flight feathers at all. We did not release it until the following spring. Some of the young mockingbirds in our yard did molt the flight feathers. We have several definite records of this but they were all of birds hatched early in the season. We have no records except that of our captive mockingbird for birds hatched late in the summer. Possibly his normal development was retarded by his artificial care.

The two young birds that we saw most constantly during the molting season were Ibby and Gabb and we give what records we have of them that might bear on this period. Ibby was captured first on June 20 and considered young to be without his parents. On July 25 he was molting on head, throat and flanks and most of the dotted breast feathers were gone. The tail had not molted but the innermost greater coverts and some of the middle wing coverts were molting. July 31 he was still molting. On August 12 his neck was particularly noticeable, being partly new and partly old. On August 17 his tail and wing feathers were molting. By September 6 he was in full new plumage. These records are mostly sight records of a bird that sat perfectly still for long periods in the low branches of a walnut tree. Gabb was banded and called "very young" on June 13. On July 31 she was molting all over including the flight feathers.

The records for Red during August are few. On August 7 it was observed that he was using his injured foot as a prop. Until this date it had been held up all the time. There is no August record of song from him.

Yellow, also, was very quiet and rarely seen. When observed she was sitting quietly with fluffed-up feathers.

Red-Sub-R's story for August is almost identical with Red's. He did not sing.

There are only three August records for Yellow-Sub-R.

Lavender, likewise, did not sing. On August 3 we say he shows the fluffed feathers that seemed to precede the molt.

The two young birds, Ibby and Gabb, have more space in our August notes than any of the old ones. Ibby became very tame, sitting on a low branch and watching us as long as we wished to stay near. We could approach close to him. He spent nearly all his time on this one branch which was in Red's territory. About August 14 he began to chip, uttering a slow, monotonous series of notes lasting a long time and given many times each day. This was quite unlike the rapid chips given earlier in the year by adults and was a tiresome sound. This continued day after day. On August 7 Gabb was seen going about the yard with a young immature mockingbird. Gabb, herself, was at this time very ragged and was molting freely. On August 14 Gabb also started this slow wearisome chipping. She stayed in a definite part of the yard partly within Red's territory and partly within Red-Sub-R's and often near Ibby's constant perch in the walnut tree. This steady chip was the only mockingbird sound heard in our yard and these two were the only immatures left of the many that had been with us in July. We wish to emphasize that when this chipping began these young mockingbirds seemed to take up these small areas in which to live. One can hardly call them territories yet they seem almost that. The decline in visiting mockingbirds came with startling sharpness about the middle of August and we think the young at this time were beginning to feel the instinct to settle down in one spot for the winter. We speculated frequently on the possibilities ahead. When Red and Red-Sub-R became again jealous owners of these territories what would become of Ibby and Gabb or would Red and Red-Sub-R prefer to find new homes for 1934?

Excluding Ibby and Gabb as well as our territory holders only 10 banded visitors were trapped or seen during the month after August 10 and only 2 after August 15. The total number of visiting mockingbirds for August was 52. Of these 18 were adults and 34 immatures. On August 18 we left to be gone until September 5 and during our absence had the food for our birds put out as usual so there would be no change in the conditions in our yard in that respect. We feel our absence made rather little difference in the figures for the number of visitors recorded during August because the sudden decrease in numbers was very noticeable before we left.

**September.**—On our return on September 5 we felt our choice of vacation time had been good. Ibby sat in the walnut chipping in the same monotone. None of our adults was singing. We could not find Gabb but aside from this, all conditions seemed to be exactly as when we left.

We wish to state here that while none of our birds sang at this time we occasionally heard mockingbird songs elsewhere and have heard them every month in the year. We do see immature mockingbirds later in the year than this. We do not know whether the parents of these last young of the year molt at the time our adults did but some adults were singing when the ones under our observation were silent.

After our return we could have watched Ibby almost all day, if we had wished, for he sat so constantly in the same place and chipped so incessantly. Sometimes, while Red and Yellow sat silently in a thick shrub of pittosporum, Ibby was near them, often very near to Yellow. The account of him ended suddenly on September 23. We felt, but with no proof, that, when Red recovered from the listlessness of the molt, Ibby left. In the case of Ibby we have no basis for referring to it as a male.

Gabb, we found very soon, had during our absence moved to the large territory which had been first Green's and later Yellow-Green's. Here she chipped the same slow steady chip with which Ibby had worn out our nerves nearer the house. On September 22 we first heard Gabb sing. It sounded like an adult song of no very high quality but was not the baby song to which we had listened earlier. The next day she was heard giving a few notes of song much like that of a California Thrasher. This song was interspersed with chips and was given while several other mockingbirds were chipping. From this time on she sang regularly and her song was always the queer thrasher-like one and for the rest of September there are many references in our notes to this, to her constant chipping and to her association with two or three unbanded mockingbirds which stayed in this territory sometimes and to which Gabb showed no hostility. It is almost impossible to overstate Gabb's prominence in this large territory at this time. She was always to be seen as well as heard. Hardly five minutes would elapse without a chip or song to show her presence and she was openly moving about the yard all the time. The raisins for her were kept at the extreme east of our lot and this was the east edge of her territory which included that originally occupied by Blue. Gabb never fought with the other mockingbirds which sometimes came in, but she stayed and they did not. Her actions were different from those of our older territory holders. She more often went past the boundaries of her territory and we read the assurance of youth in her every action. Indeed, we may as well admit, that at this time we referred to Gabb as a male and felt quite sure of our decision on this point. Sometimes she went boldly into the territories of Red, Red-Sub-R and once even flew to Lavender's territory and there took a high perch and began to sing. Red, Red-Sub-R and Lavender all began to sing on this occasion and Gabb was chased out without ceremony. As the season progressed she learned her place for she never overstepped without a lesson from her elders and soon she kept strictly to her own territory.

Our notes on all our territory holders show a great increase in volume for September. During the first of the month they were quiet. On September 12 we heard an adult mockingbird song. The immatures had been chipping for some time. Now both young and old were doing it. We found them now back, in a measure, where they had been when we began our work in January except that they were now singing much more. When one bird would chip or squawk or give a few notes of song all of the neighboring territory holders would do one or more of these things. At this time also there were evening gatherings of groups. These occurred to a lesser

extent in the morning also. These birds often flew about and gave a rapid succession of chips. It was extremely difficult to identify them while doing this but we do know that our territory holders were taking part in it. We do not know its significance. The rapid succession of chips that accompanied these flights was heard more often as the month progressed and the slow, single, separated chips, less.

After September 23 it was noticed that the mockingbirds were guarding their territories closely again, giving the rapid chips, the harsh growling squawk and a new type of song we had not before recorded. This was often given in place of the loud squawk or the series of rapid chips and it was a short and very loud song of a queer metallic quality and too penetrating to be pleasing. We think all these sounds, the rapid chips, the squawk, and this loud song, are the proclamations of ownership of a territory and that they are given when some intruding, strange mockingbird is near, or when one or more of the holders of adjacent territories gives them, in which case the total effect is that of a wave of such sounds of unknown geographical limits. The established territory holder gives one of these alarm calls on the first sight of a strange intruder and it is instantly repeated by all the territory holders near, each mounting guard on some prominent observation point, usually near his food supply which he is now ready to defend with all the ardor with which he defended his mate and nest earlier in the year. We feel that the constant, slow, separated chipping, which is used most persistently during the period of revival of territorial defense after the molt and to a lesser extent throughout the remainder of the year, also denotes ownership of territory but that it is given without the stimulus of the presence of wandering mockingbirds.

We called attention to the fact that each territory in our yard had a never-failing food supply. But many birds must hold territories, as indeed we have seen near us, in which all food failed during the winter days. We feel that birds forced out by such conditions constitute a large part of the invaders with which our birds battled during the autumn and winter. Some females, too, may be driven out and some of the birds of the year doubtless fail to obtain territories. In the largest invasion of the kind we studied, we noted that the four banded birds that we were able to identify were all immatures of the late summer which suggests that the last to hatch were the least able to establish themselves for the winter. Be that as it may, the invaders came often and the territory holders were ever on watch. The fall and winter days were punctuated by the waves of mockingbird notes which proclaimed danger, doubtless real somewhere, but carried on far past the point of origin. We never caught these invaders for they were driven on before they could enter traps.

We now return to the individual behavior of our territory-holding birds. Red's first song after the molt was heard on September 16. This was a faint, soft song given from a low bush. There were no imitations in it but it was not like the song of the immatures. After September 18 he sang his usual adult song regularly from high perches. However, almost every day at noontime he would go into a certain low shrub and sing the faint, whisper-like song. While giving this noontime song he would sometimes quiver his wings. The songs given from high perches at this season are very beautiful and often lack the imitations and flourishes of spring.

Yellow was of great interest during September. During the first of the month, like the other adults, she was quiet. A little later she was frequently seen sitting near Red and we heard the little *hew-hew* note which we had not heard since early summer. They were constantly together and we found them repeatedly in a certain shrub near their food. Beginning September 15 and continuing through the month Yellow sang in this shrub in which Red sang at noontime. She, like Red, sang dur-

ing the middle of the day. Her song was faint and hardly distinguishable from that of the immatures. At first she stopped if we came near and we almost despaired of the absolute identity of the singers. Later she let us watch her for minutes at a time and hardly stopped as we approached. There are a few records of Yellow giving the slow, separated chips. This was our first indication of the fact that the female in winter is as much a territory holder as the male. In the case of Red and Yellow there was perfect harmony and they held the territory together.

There is the same increase in our notes on the Sub-R's for September as for Red and Yellow. At first, like Red, Red-Sub-R was quiet and later in the month began chipping, singing and driving out invaders. Yellow-Sub-R was seen only often enough so that we knew she was here. She was twice heard giving the slow, separated chips. We did not see her with Red-Sub-R as we saw Yellow with Red.

Lavender, also began singing giving the chips, squawks and loud song as the others had done. By September 25 he had completely lost the timidity he showed during the mating season and his small section of territory in our yard seemed his constant abode. We found him there practically whenever we wished and this is explained by the fact that winter territory holders are food guardians and the part of his territory in our yard held his food supply.

September closed with our mockingbirds guarding their territories. All boundaries were exactly as they had been since Blue disappeared on January 30. The wave of mockingbird notes at intervals was the most familiar sound to us at this time of year. It was much as we had found it in January but these waves of protest were more frequent and more pronounced. We felt with a tinge of regret that our birds were established for the winter and that there would be little new to see until January—but this was because we did not know our mockingbirds.

The visiting mockingbirds of September number only six.

**October.**—October proved to be a month of exceptional interest. It began with really hot weather. On October 2 we noted that the singing of our birds was almost continuous. We also heard them at night. These were not, however, like the songs of the summer nights. Many times during each night a mockingbird would give a few quick chips and be answered by similar chips or a note or two of song from others and these in turn by others at a greater distance. At night there are no wandering mockingbirds. We feel that this is the ever recurring assertion of ownership by the birds carried on through the night at a time when the establishment of a territory is so important to them. It continued with decreased emphasis through the winter.

During early October the evening gatherings of a few mockingbirds chipping and flying about the yard and near vicinity ceased. By the middle of October each territory holder seemed chained to his territory.

Red-Sub-R sang a great deal in early October but never on the deodar top where he sang in early summer. Usually he was on the chimney of the house north of us. For some weeks preceding this we had heard soft, faint singing in a thick buddleia near our house in Red-Sub-R's territory. This was always during the noontime and would be heard when Red and Yellow were singing in their pitosporum. On October 1 we thinned out this buddleia and were rewarded by finding both Red-Sub-R and Yellow-Sub-R singing in it at different times. Their songs were the same soft, faint songs that Red and Yellow sang although both Red and Red-Sub-R sang the ordinary adult mockingbird song at other times of the day and in other places.

During October also we first saw groups of wandering mockingbirds coming in with apparently every intention of staying and quite certainly composed of hungry

birds. These visits we called raids and they merited the name. They occurred with what would seem nerve-racking frequency and intensity all through October and our birds were ever alert. A sudden harsh call, often two or three of them, followed by quick chips from near territories announced a raid. Red-Sub-R's territory with its date palm and cotoneaster berries seemed to be the favorite point of attack. His harsh cry would be followed by rapid chasing from tree to tree, the invaders hiding and staying low and our birds perching high where they could easily watch and where we could see them. The colored bands of the invaders were very difficult to identify. At the call our whole group—Red-Sub-R, Yellow-Sub-R, Red, Yellow, Lavender and even Gabb—sometimes responded and have at such times all been seen in a single territory where the swift flying and chasing continued till the invaders left. The largest and most violent raid of this sort occurred in Red-Sub-R's territory on October 6.

On this occasion twenty-five was a low estimate of the number of birds involved and the fight lasted over three hours. It was perfectly clear that the invaders were ravenously hungry. They snatched berries and dates at every instant lull and ate greedily almost on the wing. All our territory holders were in Red-Sub-R's territory. Some of the invaders were determined to sing and went low in bushes to do it, in some cases not two feet above the ground. Most of the actual fighting was done by Red-Sub-R and Yellow-Sub-R and at every slightest pause in the battle Red-Sub-R went to the date palm and gave a short song and Yellow-Sub-R went to the crataegus in their territory and sang. This was not the soft, faint song she sang at midday but the song of a male mockingbird and it was repeated over and over. She also gave the raucous squawks and rapid chips. Lavender and Red fought but tended to stay at the edges and give chase to any of the intruders that came in the direction of their territories although it was quite impossible at times to know much of what was happening. It was over by noon but the tension persisted all day and the air was filled with frequent harsh cries until night.

But the Sub-R's take space in our October notes for another reason. Red and Yellow it will be remembered, were always together and a picture of harmony. This was not true of Red-Sub-R and Yellow-Sub-R. They worked together when invaders threatened and at such times might be seen sitting near each other on a wire when the battle momentarily flickered out, but when other mockingbirds were not threatening him Red-Sub-R put in his whole time chasing Yellow-Sub-R apparently trying to drive her from the territory they had held together all summer. Even in a fight with other mockingbirds he had been seen to pursue her as if she were one of the enemy. She was not allowed to come near the date palm and in this she acquiesced. But the crataegus in their territory soon became the center of this family quarrel. It was at our door but they lost all suspicion of us at this time and we could watch from our back steps with the greatest ease. Their trouble continued day after day. Yellow-Sub-R never approached this bush without being driven out. Sometimes by entering from the ground she apparently reached it unseen and would hide briefly in the center, but invariably after a few moments she would go to the top and begin to sing. This song was always the same, a series of short, quick whistle-like notes of almost the same pitch, and it never failed to bring Red-Sub-R who chased her immediately out. She might give a low-pitched growl-like note instead of the song but the effect was the same. Then they would fly around and around for some minutes till she eluded him and hid in some thick shrubbery. In a few minutes it would be repeated. It was their only occupation till real danger called and we watched them for intervals of over two hours at a time knowing all the time where each one was. There would be only a short interval of quiet when Yellow-Sub-R's little



whistle-like song would be heard from the crataegus followed by Red-Sub-R's exasperated squawk and the pursuit was on. Our pages of notes on them for October are more than for all the other mockingbirds.

Red and Yellow behaved very differently from Red-Sub-R and Yellow-Sub-R. We would hear the little *hew-hew* and find Yellow sitting close to Red under the spreading branches of a large buddleia. Red watched his territory closely from high perches—particularly in the early morning hours—sitting almost motionless although the field glasses showed his head was moving slightly as he watched. He sang from these high perches and at midday from low in the pittosporum near his raisins.

Lavender, too, during October seemed to be always in our yard and always visible. Each bird was ever on guard over his food and Lavender was no exception. Remembering his timidity and our rare records for him in the early part of the year we would not now recognize him were it not for his lavender band. More than any of our other birds he sang what we called the loud song almost always answering the squawk or quick chips of others with it. He sang perhaps more than any of our other birds at this time and his song was, to us, an especially lovely one. The ordinary song was not answered by other mockingbirds; the loud song was always answered by chips, squawks or song of similar character. We noted at this time that when any of these alarm notes rang out each territory holder was apt to go to his food and eat rapidly.

Gabb, too, in October was found singing a faint song in the middle of the day in the lowest branches of an apricot tree. This song had in it no hint of the thrasher-like quality of her louder song. Our records for Gabb during this month were limited only by our time. She could have been followed about the yard for hours at a time. Her headquarters were in a crataegus bush and when she heard the harsh call of alarm she would go instantly to this and eat a few berries.

On October 10 Gabb was seen sitting in this crataegus singing over and over the short thrasher-like song and these songs were answered by another mockingbird on a tree tobacco in the southeast corner of our yard. They sang back and forth, first one, then the other. Red, Red-Sub-R and Lavender took no part. It had none of the sounds of a quarrel. Our field glasses revealed that the mockingbird in the tree tobacco was Blue who had been gone since January 30. She had now returned to her quarters of the preceding winter. To us this was very interesting. She now took up exactly her old territory and Gabb was restricted to the territory Green held before Blue left. How was this understanding reached? There was no quarrel. Blue took her old ground. Gabb withdrew from it. We put a pool for Blue in her part and a raisin table for Gabb in her part. Each kept entirely to her own ground. Neither was seen in the territory of the other for some months. Their calls across the yard to each other were somewhat similar in tone and were short songs of three or four notes and are to us a pleasant memory associated with warm October days. Blue immediately assumed her character of the preceding year. She was very tame. She was never seen to take part in a fight but at an alarm would fly to her elderberry bush and eat and then to her raisins. And so at the end of October we looked forward eagerly to November with no thought that any month would be dull.

**November.**—On November 8 our notes speak of our birds as growing quieter. They sang less but there was much evidence of their presence each day. Early dawn began with a wave of chipping and of song notes and through the day there were varying numbers of recurrences of this. Each bird, while quiet compared to earlier fall, was, nevertheless, alert and on guard in a secluded place near the food supply. At the first call of danger each was up on a perch where it could overlook its terri-



tory. Often there was only a single call from each bird but a real raid of any duration found each of our territory holders in its place, Red-Sub-R in the date palm, Yellow-Sub-R near the crataegus, Red in a young elm overlooking his raisin bowl and Yellow, if seen at all, below him, Gabb would fly immediately to her crataegus and Blue to her elderberry while Lavender perched on an elm overlooking the whole part of his territory in our yard. At such times the calls of our old male mockingbirds were distinctly the loudest, harshest, and most peremptory although Yellow-Sub-R had been heard to give a similar cry when battling invaders.

On November 1 we were able to keep a record of the number of times the wave of song or chips traveled over our yard. Between 8:30 a. m. and 4:00 p. m. this ripple of sound was heard ten times. A day or two later, while outside, Red was heard to chip sharply. Gabb flew up to her crataegus and called, Blue flew to a bush near her food and gave two song notes, a mockingbird southeast of our lot chipped and so did one directly east. Coming to the front we found Red chipping, Lavender singing his loud song over and over and Red-Sub-R chipping, while across the street to the west two other territory holders were excited. Thus, Red's chips had, to our knowledge, involved the birds in nine mockingbird territories and probably the disturbance went considerably beyond our ability to hear it.

During November the records of song went steadily down. The fall singing was ceasing and with it the few notes of loud song, which are often substituted for chips or squawks. The chips and squawks continued much as before. On November 26 two mockingbirds were heard singing. We noted the song because we had heard none for some days. Neither of these birds was one of our territory holders but one was an unbanded territory holder just east of Blue's territory. That was the last song heard in November and the night calls also were much reduced in number.

Red-Sub-R spent November guarding his date palm. His hostility to Yellow-Sub-R had subsided to some extent. He had been unable to drive her out but he now made no further effort to do so. If she went near his date palm he gave a note or two of song. She answered with a faint growl-like note. By November 8 we realized that, although he had failed to drive her out, she was really living in only a part of their territory which she kept as her own. This small corner was near their raisins and both birds ate them. Yellow-Sub-R did not, however, lead a peaceful life. If she approached the crataegus bush, so long a bone of contention, and which Red-Sub-R could see from the date palm, he squawked harshly. The fence beside this bush led directly into the thick shrubbery of her little territory, a tangle of buddleia, plumbago, the feijoa, persimmon and a fig tree. At Red-Sub-R's squawk she would run along the fence and disappear in the shrubbery.

But Yellow-Sub-R was not to keep this refuge long. On the morning of November 14 the raucous call of alarm was heard at 8:00 o'clock. The trouble centered on Red-Sub-R's date palm. He and Yellow-Sub-R, who went at once to the fray, fought in what had been their joint territory. Lavender and Red came to the edges of their territories. The invaders were not many and the battle was over in half an hour but Red-Sub-R and Yellow-Sub-R behaved strangely. He kept singing in the date palm. Then he would go to the cotoneasters and eat. Then both Red-Sub-R and Yellow-Sub-R would come to the crataegus they had fought over. Then she would go to the box elder near and he to the chimney. Both were in his territory and neither came to the corner that we had begun to call her territory. Now there came a harsh call from Red and he was found on the edge of his territory, and in the persimmon tree that belonged to the Sub-R's was an unbanded mockingbird. Red did not fight it but seemed rather to be setting the line it might not

cross into his territory. Yellow-Sub-R gave harsh calls from the chimney but did not come. Red-Sub-R sang from the date palm but stayed there. This unbanded bird flew to the raisins and grapes and ate ravenously and then ate persimmons. Then it flew to Yellow-Sub-R's little thicket and walked out along the fence as Yellow-Sub-R had so often done. Yellow-Sub-R now came to the fence and approached the unbanded bird facing it and bowing and bobbing. One would step forward and the other back and then they would reverse. Then Red-Sub-R took Yellow-Sub-R's place for a short time. Then she returned. We observed this performance to be repeated six times that day, sometimes on the fence, sometimes on the ground near the fence. Later Red faced this new bird in the same queer dance on the ground at the edge of his territory and he did not leave that edge of his territory all day as far as we knew. The whole affair ended by the new unbanded mockingbird keeping for her own the little territory of Yellow-Sub-R.

The next day it was apparent that Yellow-Sub-R was not going to give up her territory without a fight and she pursued the newcomer over and around the small territory always with the same result. The new mockingbird would succeed in getting under cover and Yellow-Sub-R would wait outside the shrubbery till the new one appeared again. What strange inhibition kept her from entering? She never did while the new one was here. As the battle in air was renewed the new bird made a twittering sound as she tried to escape Yellow-Sub-R. Several times they met and seemed to claw at each other in mid-air. After one of these encounters Yellow-Sub-R sat on the fence for 45 minutes. The new bird kept Yellow-Sub-R from the raisin dish that had been hers for many months. Red-Sub-R would not let her come to the date palm nor to the crataegus bush. We put raisins near her perch on the fence. As soon as she approached them, Red-Sub-R drove her away. When the new mockingbird sang a note or two of song Yellow-Sub-R at once flew to the top of the boxelder near the crataegus and sang and Red-Sub-R gave one harsh call but no other bird answered it. Again Yellow-Sub-R was driven from the crataegus by Red-Sub-R and ran along the fence and was met by the new bird and the ducking and bobbing of the queer dance began once more. On this day the new bird was trapped and banded as C103462 and with the color combination AB-RG. For some reason we failed to shorten her name and she is AB-RG to us still.

The next day the excitement had subsided. AB-RG had been seen in the dance with Red and Yellow, with Red, with Red-Sub-R and Yellow-Sub-R together and with each of them separately. Sometimes, thus, three birds were involved and sometimes two. On one occasion Red and Yellow were the pair concerned. Red and Yellow both faced AB-RG. Then Yellow withdrew and stood a few feet away from the other two. Red and AB-RG now took little jumps going back and forth and keeping approximately the same distance from each other. When one jumped the other did, too, and as one went forward the other went backward and so they stayed in a small space dancing for some time. This occurred in all cases with Red at the edge of his territory—practically on the line we would have drawn to separate his territory from that of the Sub-R's. When the dance concerned Red-Sub-R and Yellow-Sub-R, or either of them alone, it occurred on the boundary between the territory taken from Yellow-Sub-R and the territory held by Red-Sub-R. Is it probably a ceremony marking territorial lines? We have seen it before but never with marked birds except in these cases.

Strangely, Red-Sub-R soon permitted Yellow-Sub-R to return to his territory and November closed with no show of hostility between them. They were together in the date palm, at the raisin supply and in the much fought-over crataegus.

We at once decided AB-RG was probably a female because we thought Red and Red-Sub-R would never have permitted a male to come in as she did. AB-RG now was easily observed and interesting. At first she spent a large amount of time in giving the slow well separated chips. This we have described previously and, just as the immatures, Ibbey and Gabb, tried to claim their first small territories and as our adult mockingbirds after the molt had done, now AB-RG was doing. She promptly took complete possession of her new quarters. The raisins that had belonged to Red-Sub-R and Yellow-Sub-R were now hers and she drove all kinds of birds from them and from the persimmon tree. Last year Red-Sub-R was driving these birds out in the same way from the same place. Without hands we would have assuredly mistaken the identity of the bird doing it this winter. AB-RG drove jays from the persimmon with no uncertainty but she was seen to look at a thrasher without attempting to drive him out. Red watched her closely and she often attempted to enter the shrubbery at the edge of his territory. A loud squawk from him would send her hurriedly back and would be followed by his appearance.

The raisin dish of AB-RG and that of the Sub-R's were less than twenty feet apart yet she never went to theirs nor they to hers. At this season freshly cultivated ground and water running from a hose were great attractions to our mockingbirds. If such attractions were provided, as they often were, near the border, yet within the territory of AB-RG, Red-Sub-R and Yellow-Sub-R never came to them. If they were on the Sub-R's side of the boundary line, AB-RG did not go to them. Red and AB-RG were once seen at the water at the same time when it was running practically on the line between their territories.

The records of Red for November are numerous and uniform. He seemed always on guard. Perched in the top of a small leafless elm he seemed to be watching in every direction. AB-RG was at first ready to overstep and enter his territory but was rarely able to do so. After a few days her tendency to do this ceased but his watchfulness did not. He fought off many intruders during the month and his response to the trouble call from Red-Sub-R and Lavender was immediate.

In nearly every record of Yellow for November she was with Red and sitting below him. During fights she was always present.

Gabb was, as in October, easily found and there are records of her practically every day and as often as we wished to look each day. Early in the month she still gave a few notes of thrasher-like song whenever the other mockingbirds gave the quick chips or squawks but this decreased in both length and frequency and by the end of the month no song was heard from her although she gave a single call, in response to the others, which was different from that of Red, Red-Sub-R or Lavender, and similar to that of AB-RG, and of Blue. The crataegus near her raisin table was her favorite perch and she still went there as soon as the mockingbirds near gave their harsh cries. As a matter of fact her troubles were usually imaginary for we have no record of the crowds of invaders entering this part of our yard. On the day AB-RG took Yellow-Sub-R's territory the invaders were not near Gabb yet she was uneasy all day. When the birds in the front called she would hop nervously about. By the end of November she was quiet, but seen much more than Blue.

In November there are a great many records for Lavender. A few moments search seemed always to reveal his presence in the small corner of our yard near his food. He would watch us as we dug ground for his benefit below him but he never failed to show uneasiness if we stood watching him closely. He did not, however, fly or hide but began moving about. During the first half of November he sang rather often. November 15 is the last date of real song from him. The short, loud song given in response to the squawk or rapid chips of another bird now ceased

and he, also, responded only with the chips or harsh squawk. At the first sign of trouble in Red-Sub-R's territory, Lavender was on a high elm above his territory. He usually stayed there till it was over giving his harsh call now and then although as a bird came near he might actually enter Red-Sub-R's territory. No call of trouble in adjacent territories was unanswered by any one of these three old male birds. Lavender also still gave the slow separated chips at times.

Blue became quiet during November. Most records are merely that she was seen. Only twice during the month was she heard to make a sound. On November 21 she answered a call from Gabb with two song notes and later was heard to chip. She was tame but usually we found her hiding or saw her at her food tray. She generally failed to answer the calls of the other birds but instead went hastily to her food and ate when the cries of the other mockingbirds announced intruders.

**December.**—We now come to the last month of the year. On December 8 we heard a few notes of song and more on the days immediately following. Among our own mockingbirds this was all the short loud song given in response to the trouble call from other mockingbirds. This type of song was the last to cease and the first to begin. December of 1933 was remarkably mild and this may be one reason for as much singing as we heard. On December 10 the mockingbird holding the territory just east of Blue was heard singing a real song. We had noticed this bird all winter. He wore no bands and as far as we know never crossed our fence. Blue's raisins were within four feet of this line but he never responded to them either there or in a trap near. This bird was the first singer of the new season in our neighborhood and by the end of the month he had been heard many times. By December 27 we had recorded Red, Red-Sub-R, Lavender, and neighboring birds as giving the short, loud song. AB-RG, Gabb, Blue, Yellow, and Yellow-Sub-R had not been heard to give any song notes at all. During this month also the waves of chips and squawks so noticeable during the fall months decreased quite definitely. Sometimes invaders came but less often.

Red-Sub-R and Yellow-Sub-R were repeatedly seen together during December. They were in the date palm together, in the crataegus together, hunting insects together. During fights the two worked together and very effectively. Yellow-Sub-R did the things Red-Sub-R did but she was not seen singing at all.

AB-RG was the bird we saw most during December. In a very small territory she was extremely active. She spent a great amount of her time on a wire about half way between her raisin dish and the persimmon tree. She drove off all kinds of birds from both places. About the middle of December this activity decreased distinctly although she still drove them off frequently. On December 11, AB-RG was watched for two hours at one time to see if she really did remain in this small area as she seemed to do. During this time she never left it although she moved all over it many times never stopping except where she could see the food. When a bird would come to the persimmon tree or light near her raisins she watched it silently. As soon as it approached to eat she flew at it. One Audubon warbler, which we could recognize because it was banded, would behave very apprehensively as it came near the fruit stretching out its neck in the direction of AB-RG and rarely getting a taste before it was driven off. We saw AB-RG driven back by Red during this two-hour period but we could scarcely say she left her own territory, so quickly did he come. At other times, too, we watched and she was always in sight, so we feel that she stayed within this small area for some weeks. When there were invaders in Red-Sub-R's territory she took an active part in the fighting.

On December 29, however, we failed to find AB-RG in her small territory. The next day we found her in the part of Red's territory that was in our yard. This

was very disquieting to us because at the same time we could not find Red. By December 31 AB-RG was perfectly at home in this part of Red's territory and spent most of her time in it. She no longer chased birds away from the persimmon and she ate her raisins from Red's bowl.

During early December Red was as steadily on guard as at any time during the fall. In the early morning repeated, sharp warning calls came from the top of the small elm which was his favorite watch tower. AB-RG was a trial to him. Once she entered a trap in his territory and when she was released he started at her. At other times he drove her out sharply when she entered the edge of his territory. He was seen several times by us in December at the south border of his territory which faces the street south of us. There was a poor specimen of a date palm at the southwest corner of his territory on this same street and this contained a few most unattractive looking dates from which Red was seen to drive several other mockingbirds. When we could not find him on December 30 and when RB-RG was seen in his territory, we were suddenly sure we had lost him.

Yellow was not seen a great deal during December and was usually with Red when observed.

Lavender could be found at almost any time during December. We made a point of hunting him up and identifying him each day as a matter of routine, but his calls gave us frequent assurance of his presence. His activities were much as they had been during the preceding month although we felt that invading birds came less often and that the strident squawks were less frequent and possibly a bit less peremptory.

Blue was quiet but we have a few more records of activity from her than during November. This may be purely chance. She was seen chasing out two mockingbirds once during December and once when Red was driving birds from his territory she flew to a tree top. She would allow us to come close to her, but except for the rare times when she called or was excited by the calls of other birds it was difficult to find her even in her small territory.

Gabb also behaved much as she had during November. She answered when any of the other mockingbirds chipped or squawked and on such occasions often flew to the top of a small tree. She is recorded for practically every day and was so easily and constantly found that daily identification was a routine observed because we knew it was a necessary part of our work.

December had been, on the whole, a continuation of the conditions prevailing in November. The battles had grown less frequent and less violent and there were a few records of song with a hint of spring in them but these were rare.

**January.**—Red had disappeared. We recalled he had been seen in December driving out mockingbirds from a date palm in the southwest corner of his territory. We could see the house that hid this tree from us and, hearing the strident calls that meant invaders in that section of his territory, we watched the house top with our field glasses and saw there, for a short moment, a bird with a twisted foot. With this to aid us, from the street in front of the palm, we easily located both Red and Yellow defending the poor crop on the date palm. This happened on January 1 and so we began the new year knowing Red and Yellow were still in their territory together and that they had left our yard voluntarily and apparently completely. Did Red, needing to guard these dates, vacate the territory that lay in our yard knowing that AB-RG would occupy it and that she in turn would vacate it with the opening of the mating season and permit him to reclaim it? It was true that about January 1 every male territory holder changed his headquarters a little. There was no great change for that could not be in such small territorial areas.

It was now more difficult to get records for Red and Yellow yet we were able to learn something of their January life. We watched Red's date palm whenever we passed and we saw him in it or near it more than once. But our records for him were far apart. On January 15 he came with Yellow to his raisin bowl in our yard, ate and left, paying no attention to AB-RG. The next day his crippled foot again let us identify him singing in a small acacia in one of the courts. We can see the top of this little tree from our yard. Our records now became more numerous for we had this tree to watch and found also that he could usually be found in the late afternoon on a wire in front of the courts where we also saw Yellow and we felt sure the bird that sat below him as he sang in the acacia was she.

At about the first of the year Red-Sub-R and Yellow-Sub-R ceased spending a large part of their time in their date palm and often seemed to be on the north side of the lot north of us. On January 3 a faint, whisper-like song was heard near a clump of giant bamboo at the front of our house and the singer proved to be Red-Sub-R. It was, as far as we know, his first song of the year and it was faint, but varied and from a short distance it sounded far away. He sang by this clump of bamboo all through the rest of January and while his song became louder it did not, at any time, approach the ecstatic song we so commonly associate with the mockingbird. Yellow-Sub-R was nearly always near him. Late afternoon found him always perched on the chimney of the house north of us, often with Yellow-Sub-R near him on the roof or in a tree near at hand.

Lavender left the privet bush in which he had been constantly found for many weeks and was, after January 1, generally in the lower branches of a grevillea tree at the south edge of our lot. On January 12 he had a prolonged battle with three unbanded mockingbirds which insisted on coming to his camphor tree. This was not the violent fighting of early winter. His calls were less harsh and less frequent and his fighting consisted only of flights at them as they took the berries. They kept returning and no other mockingbird answered him or paid any attention to his predicament. It indicated to us that the winter battles were over and spring almost at hand, that the time had come when few males were wandering and when the females were not molested. On January 16 Lavender chipped at some strange mockingbirds but did not pursue them at all. He began to sing on January 5 and sang all through the month, singing more on warm, bright days.

Gabb, we have previously confessed, had been regarded as a male in her early days with us. Her intrusions into other territories, her constant song in the fall months, her interest in fights at the same time, had indicated to us that she was of the masculine persuasion. But before January we began to question this because she became quiet and spent so much time sitting in one place almost without moving. When the males began to sing she did not sing.

On January 5 interest in Gabb went high. Another bird came to her territory and stayed close to Gabb. The two flew from place to place—the stranger, usually, but not always, following Gabb. They kept up a little rasping sound which both made and which was usually heard as one approached the other. This was a prolonged sound, rather growl-like, perhaps. Once a few notes of song came from the visitor when Gabb was on the ground below him. This visitor was BB-GA and it was one of the parents of the pale immature we had banded the preceding summer. It had visited us then a number of times. On January 6 he was still with Gabb, and again on January 7 and January 8, on which date we saw him fly off to the southeast where Gabb followed. On January 9 Gabb was back. While we watched her she suddenly again flew southeast in the exact direction she had gone the day before. She was not seen again till late afternoon. On January 10 and 11 she was in our yard.



BB-GA was here again on January 12 and we heard the same notes and BB-GA followed her about the yard again. On the next four days, January 13, 14, 15 and 16, Gabb was quiet and sat in the crataegus. On January 17 she could not be found at all but was here on January 18 and on that day was again seen to fly southeast but was back in her territory in the afternoon. The next four days she seemed to spend here sitting almost motionless and making no sound. On January 22 and 23 we could not find her at all but she was here January 24 and on that day BB-GA was again here. We saw him come, eat some crataegus berries, and go. Gabb was here when he left but we have never seen her since. We hope she left for the territory of BB-GA and that we shall see them both later in the year bringing a brood of young to our food.

During January we watched Blue with especial care. We were expecting her to leave as she had the previous year. Like Gabb, she spent much time sitting quietly in one place and seemed almost unbird-like in her silence and immobility. About the middle of the month we twice saw her appear to show some interest when a mockingbird near began to sing, turning her head as if looking in the direction of the song. On January 24 and again on January 25 we did not find her in her favorite dead tree tobacco. Gabb had left us so when on January 26 we saw a bird sitting quietly in the top of her crataegus we looked at it with care and were surprised to find that it was Blue. Evidently Blue had gone into Gabb's territory almost as soon as Gabb left. At first it seemed a waste of energy, on her part, to us. We saw her eat the berries, however, and felt perhaps they had tempted her to move into the vacant territory.

On January 29 we were amazed to see Red in this crataegus with Blue. He was making the little rasping noise we associate with the beginning of the mating season. But he left for his own territory, which is adjacent, as the unbanded mockingbird from the territory east of Blue's came into the yard. This bird had held his territory all winter. He had sung later in December and earlier in January than any of our banded birds. We felt sure the bird now coming into Blue's territory was this singer. He came straight to Blue making the same little rasping noise Red had been making and followed Blue from place to place all about her new territory as well as about her old one. They both made the rasping note, apparently, but he much oftener than Blue. Red came again and was chased back by the unbanded bird. We were, at the time, much puzzled by Red's actions for we knew Yellow was in his territory. We suspect it was nothing more than interest in other birds' affairs for we have since seen male mockingbirds quite surely mated, leave their territories for a moment to approach a pair which were making these rasping notes. Red did not come again and the unbanded bird spent, as far as we could tell, the entire day in Blue's territory. He ate raisins and pomegranate at her table and bathed in her pool and sang all over the yard. Blue would fly to him as soon as he sang a little whistle-like song of enticing quality. As they approached each other they always made the rasping note.

The next day was a repetition of this. We would see them sitting together in the crataegus. If he flew away a short distance he gave the little whistle-like song and she flew to him. The next day he took her to his territory, just east of hers, part of the time but they were often in her territory. We now felt almost sure they would be mates and we noticed at once how definitely his song had decreased. It was not at all what we had heard for some days from the chimney of the house in his territory but was the little whistle-like call to Blue or the more mockingbird-like songs sung at intervals in many places in our yard as well as in his own territory. We heard the little *hew-hew* note. We noticed when Red sang in the court next to us

that the new male promptly began to sing, too. We hoped he would soon be wearing our bands.

AB-RG, like Gabb and Blue, had become quiet. In mid-December, it will be remembered, we watched her at one time for two hours without once losing sight of her for more than a brief instant. On that occasion we attempted to write down everything we saw her do in the two hours and it was extremely difficult to write rapidly enough to follow her quick actions in her very small territory. Now in January we saw her four or five times a day but we had to take every opportunity offered to do this. She was now in the combined area of her former territory and the part of Red's territory that was in our yard. If she went beyond this into the rest of his territory, we did not see her do it. If there was any disturbance among the mockingbirds AB-RG gave a single call and by locating this sound we often found her. About the middle of January she began to sit in the walnut tree above Red's raisin bowl practically all the time with the same fixed air of immobility that we had watched in Gabb and Blue. From this place we heard her single call at dawn when the early morning round of mockingbird notes was heard. This now (January 15) consisted of song from both Lavender and Red-Sub-R and these similar single calls from AB-RG and Gabb and probably also from Blue. Red and Yellow were too far away and we were never able to hear any notes we could recognize as Yellow-Sub-R's. She did not give the call given by Gabb, Blue and AB-RG. On January 29 and on January 30 we realized AB-RG was more active. She moved about her whole territory again with some freedom and seemed more alert.

It will be apparent that the end of January left us in suspense. Would Red and Yellow return to us? Would they be mates? Would Red-Sub-R and Yellow-Sub-R be mates? Would Blue and the unbanded mockingbird mate and would Blue leave her territory in this case for his? What would AB-RG do? We hoped February would answer all these questions.

**February.**—It was apparent by February 3 that Lavender was showing an interest in AB-RG. He was seen in her territory on that date and she in his. These two territories were now adjacent. He explored every part of her territory and stayed in it for short lengths of time but never remained in it for hours as the unbanded mockingbird had remained in Blue's. She often went into his territory and we heard the rasping note as they flew about the grevillea trees together and Red-Sub-R showed the same interest in this that Red showed when the unbanded bird visited Blue, coming over into Lavender's territory for a moment when he heard it. On February 8 we spent much time watching AB-RG. She was not seen in her own territory at all that day. Lavender sang early in the morning in our yard and he and AB-RG were flying about over his grevillea trees often. While they did this a mockingbird that holds a territory directly west of us and across the street came, singing as he flew, to our yard and went back singing and flying from one high perch to another. We think he thwarted our hope that AB-RG would mate with Lavender, for she is the mate of this bird, AY-YB by color combination and Yellow-Blue by name. They have since then come together to steal Lavender's camphor berries. On this occasion we described the sounds Lavender uttered as fierce hisses although they might be described as intermediate between the winter squawks and their summer equivalents, the growls.

Lavender left our yard for the part of his territory across the street when AB-RG left him and for the rest of the day from a tall cypress, an elm and the house chimney sang the most ecstatic song we have heard this spring. We watched him coming to our yard twice and knew it was surely he and we were much puzzled, not knowing then that AB-RG had left. This lasted only that one day. The following day he

was almost silent and we were more perplexed than ever. The solution came quickly. He had found a mate and they were soon often together in our yard, she wearing a single aluminum band but no colored bands and therefore she is probably a bird banded by us more than a year ago.

We felt that Lavender almost at once again showed an aversion to our curiosity concerning the activities of himself and his mate but that it was less pronounced than during the preceding year. He sang a little song, or repetitions of two notes, to which his mate responded by following him. He perched above her quite constantly the first few days they were together and gave anxious sounding notes and queer little trills if we went near. On February 15 he was seen perched only one foot above the ground in a thick tangle of shrubs singing a faint song while she moved about on the ground beneath him. This song was a low whisper and very beautiful. Until Lavender was actually seen as the singer it was thought of as at some distance instead of only ten feet away.

It was February 8 when AB-RG left Red's territory. On the morning of February 9 we heard singing on the radio pole of the court near us where Red sang so much last year. Delighted, we identified the singer as Red. Soon after from his own old place in our walnut trees he floated gracefully down to his raisin bowl and ate. Then Yellow came and ate. He gave little double call notes from the fig which was his and she responded by following him. He went to the top of his little elm to sing and has, since that morning, behaved as if he had never left us. He and Yellow were found together on February 13 within a foot of each other in the branches of a thick drooping buddleia where he sang a faint, soft, whisper-like song. He sang daily in our yard and was repeatedly seen, sometimes singing, sometimes quiet, with Yellow sitting below him in the bare branches of the small elm tree. He sang late in the afternoons quite regularly in the south part of his territory where he was seen on February 14 with Yellow going into the thick plumbago covering one corner of one of the bungalows.

Red-Sub-R and Yellow-Sub-R were also obviously mates. His song, like Red's, and Lavender's, was that of the mated bird, heard often, but always controlled and only at times sung from some high perch. Later when nesting has begun we shall expect these mated birds to sing from higher perches where they can be better watchers for all the intruders that may mean danger to the brood. On February 9, the same day that Red reclaimed the territory AB-RG had used, Red-Sub-R perched low in the thick shrubbery of the little corner which AB-RG had stolen from Yellow-Sub-R and gave some extremely strange notes, single calls, and as he did so he kept looking up above him. Then, still low in the shrubbery, he sang. Then he went higher and sang and at different times that day he sang in every part of that area, apparently reclaiming it as the property of the Sub-R's. On February 15 he sang in it the same sort of faint, soft song that Red sang with Yellow beside him and that Lavender sang just above his mate. Yellow-Sub-R then ran along the fence and into the thicket where he sang. We had hollowed out this thicket below and from beneath we watched them there together while he sang. He seemed far less suspicious than he was a year ago and let us watch this singing, surely knowing we were there.

We feel sure Blue is mated. Her mate is banded with our bands now and his combination is BA-RG, which makes his name Barg. He has annexed Blue's large territory to his own and sings the happy-sounding song of the mated bird in Blue's favorite tree tobacco or in Gabb's crataegus as well as on his own side of what has been the dividing line between territories for more than a year. This is our only instance of the male bird taking the territory of the female. In this case he also retains his own.

We have many neighboring territories occupied by birds we banded with colored bands during 1933. We are unable to make more than occasional notes on these but as far as possible we locate them. Every territory in our yard, with the exception of Barg's and Blue's, is exactly as it was a year ago at this time.

At night we now again hear a few occasional short song notes in the place of the rounds of chips, squawks and loud songs that occurred at night in the fall and that reached a minimum during December and January and we have once already heard a mockingbird practicing imitations during the night—each different note or group of notes repeated two or three times with no other song intermixed.

A survey of our yard as we conclude at 9:30 a. m., February 15, 1934, shows Red singing in the top of his small elm with Yellow a few feet below him. Red-Sub-R is singing on a wire by the giant bamboo into which Yellow-Sub-R was just seen to go. Lavender is singing the little whistle-like call for his mate, and Barg is singing on the line that marked the boundary between his territory and Blue's, while Blue sits in a box elder well within Gabb's old territory. This round of song often permits us to find all these birds at one time although each one often sings independently and will, as the season advances, pay less attention to the songs of others as the work and worry of the nesting season increases.

#### CONCLUSIONS

Although our birds have exhibited great individual differences, we venture to state the following conclusions which we believe are well founded for the birds and for the time interval under discussion.

**Territories: Summer and winter.**—We have come to think that our birds have two general types of territories, summer territories and winter territories. The terms summer and winter should be understood to be somewhat flexible in time duration for the different birds, for by summer we mean that part of the year from the time that the males begin their mating season song until the revival of activity after the molt, and by winter the remainder of the year. For our birds during the year under discussion these division points are some time in December or January and mid-September. The summer and winter territories of an individual or a pair may or may not be identical areas.

The summer territory is the family home, held and defended by the male and occupied solely by him until the female joins him, unless his mate of the previous year has remained with him. The female rarely takes part in the defense of the summer territory.

The winter territory centers about the food supply and is defended by both the male and the female, in case the pair remain together, or by the lone male or female occupant. The winter territory of the male may be only a part of the summer territory either because of a withdrawal to the area close around the food supply or because he apparently willingly gives up a part of his territory to a female for her winter territory. This last mentioned habit must be an important factor in the distribution of the females when the mating season begins.

**Defense of territory.**—The defense of the winter territories seems much more vigorous than that of the summer territories. This may be because the invaders in the winter are much more numerous than in summer and because the territory holder has many other things to do in the summer while in winter the defense of the food supply is the only important activity. During the molt there is a general and decided slackening of territorial defense, a listlessness on the part of all the adults, followed by the building up of the winter type of defense as the revived activities of the wandering, supposedly territoryless, mockingbirds progress. During December

and January the males change gradually from the winter to the summer types of defense while the females pass through a period of great immobility, seeming to forget almost entirely about territorial defense, from which they revive, each soon to join the male of her choice. This period of immobility was not noted in the females of the two pairs that stayed together all winter but they did discontinue all participation in territorial defense.

**Occasional overstepping of territorial boundaries and changes in territories.**—It is rare that mockingbirds, once established in their territories, go beyond these boundaries, except at the two transitions between the summer and the winter seasons. However, they have been observed to do so under a number of circumstances. The mere mention of these circumstances gives them almost too much importance compared with the dominating tendency that causes the mockingbirds to stay within their own territories. On the other hand, at the beginning of both the summer and the winter seasons, and under some circumstances during those seasons, territories may be abandoned or annexed in whole or in part. The detailed conclusions from our observations are:

A male driving an intruder out of his territory may pursue it into the next territory or even all the way across that territory and then return immediately to his own.

Either sex may go into unclaimed areas or into another occupied territory to obtain food for themselves or for their young, returning immediately to their own territories.

Either sex, the male in the summer and either in the winter, may enter an adjacent territory to take part in a fight with intruding mockingbirds. Such occurrences in summer are rare.

A male, even though mated, may visit an adjacent territory apparently to watch a newly mated pair, or either sex may go temporarily on the occurrence of an unusual circumstance that excites its curiosity, such as a mob protest against a hawk or an owl.

An unmated male may enter the territory of a lone female or of a mated female in an attempt to win her as a mate. We know of no case of his abduction of a mated female.

At the beginning of the summer season the female may: abandon her winter territory, or be driven out of it by the previous male owner of that territory, and wander until mated; leave her territory with a male who has come to court her from a more or less distant territory; remain in her territory as the mate of a male from an adjacent territory who then annexes hers, or as the mate of a male without a previous territory.

Either sex may become lax in observance of territorial boundaries at the end of the molting season and the birds are sometimes observed short distances outside their territories. Usually the territorial bonds soon tighten and the birds remain at home, but we surmise that these bonds may sometimes break and the birds leave either to establish winter territories elsewhere or to wander all winter.

A male may permanently desert a territory upon the failure to obtain a mate, either a first mate for the season or another mate after having lost one.

Either sex may permanently desert a territory because of failure of the food supply within it.

Either sex may annex, more or less permanently, an abandoned territory or an abandoned portion of a territory.

There is a great difference in individuals in ability to abide within their own territories in peace and harmony with their neighbors. Most of them intrude little or not at all while the rare individual or pair continually oversteps its boundaries and has to be chased home.

**Size of territories.**—The approximate sizes of the territories under observation vary from 3,750 to 60,000 square feet and are indicated on the map. It is probable, in fact it seems certain, that the average size of mockingbird territories must be much greater than these because the food and water supplies and the combination of trees, shrubs and lawns in our vicinity are such as will support a large mockingbird population.

**Songs and notes.**—The songs and other notes of mockingbirds offer a large field for study which would contribute materially to the understanding of bird psychology. We do not feel that we have gone far with this work but we do recognize different songs and notes as belonging to different times of the year and as being used for different purposes, or at least on different types of occasions.

**Songs of the males in summer.**—The males have a set of summer songs and a set of winter songs and some songs that seem to be the same in both summer and winter. In the early part of the summer season the male that has not retained his mate from the previous year or has not obtained one at the very start of the season, works up his song of advertisement or of territorial proclamation until he obtains a mate. This is usually sung from high perches. We suspect that this may be, in reality, two songs, one for the purpose of advertising himself to any female that may come within hearing distance, and another to advise all males in the neighborhood that he is the owner and is ready to defend his territory.

On the arrival of the mate these songs almost entirely cease. After the arrival of the mate the male often sings a short call song consisting of two notes of different pitch repeated several times, or a series of notes on the same pitch, to which the female often responds by flying to him. During this period the male sings also a typical mockingbird song, though much subdued compared with the advertising song and having little or no imitation in it. We speak of it as a happy, contented-sounding song. Also, he sings a faint whisper song during mid-day while sitting close to his mate in low shrubbery.

During this time one or both birds are prone to give a rasping note when one approaches the other, and when they are sitting together quietly they sometimes give a faint *hew-hew* note. During this time also, and throughout the summer season, a note much like the rasping note spoken of above but much louder and harsher, is often given when a male is chasing an intruding mockingbird out of his territory. We have referred to this note as a growl or as a fierce growl.

When the nest building begins all the songs of the male become much diminished and this state is maintained in most cases during incubation and until the young are old enough to allow him more leisure from his family cares. Then his singing increases and continues until the molt. The volume and frequency of his singing during this latter period depend upon a number of circumstances such as additional broods of young, the presence of annoying jays, the presence of other mockingbirds and the amount that they may be singing as well as the individuality of the male. The songs of this period merit much study.

If the male does not succeed in getting a mate his advertisement song continues with increasing fervor until late in the season when, having failed, his song ceases and he leaves his territory. Or, having obtained a mate and having lost her, his song immediately jumps to its maximum and continues, almost without cessation, for several days. If no mate responds, his song ceases and he leaves. In both such cases the song reaches its maximum brilliancy.

A male trying to steal a territory from another male has a characteristic song which he sings from low in the shrubbery. This is a whistle-like song without much variation and is of short duration. At first this song is rather faint, but if not driven



out he sings with increased loudness and from higher in the shrubbery until finally he is singing the typical territorial song from high perches. The progress of these events depends upon the relative successes of the defender and the intruder.

The males often introduce into their songs good imitations of the notes of other birds that are common about them. Our birds imitate principally the California Jay and the California Woodpecker with which they are associated almost constantly. But their best imitation, if it is in fact imitation, is that of the squeaky, begging note of the baby mockingbird. As soon as the female is incubating the eggs and before any baby mockingbird notes are heard in the vicinity, at least some of the males introduce a series of this baby squeak into their songs and continue to do so until the babies are big enough to do their own squeaking. Is it imitation or is it anticipation?

Extreme anxiety about the young when a jay, cat, human, or something else is menacing the young, is expressed by a loud, harsh chip which slurs off into a gurgling noise of somewhat lower pitch. For want of a better term we have called this a gurgling note.

**Songs of the males in winter.**—As probably the first indication of revival of activity after the molt, about the middle of September, the males at mid-day from low thick bushes sing a soft, faint, varied and beautiful song having no imitations in it. Each male, so far as we have observed, sings this song from the same place and it may be sung only by the males that still have their mates with them since we have observed it only in them. This is the same faint mid-day whisper song observed to a much less noticeable degree in the early summer.

At the same time and in the same place the pair may give the little *hew-hew* notes which are given in the early summer.

About this time the males begin their quick chips, harsh squawks and short, loud songs, all of which increase rapidly in vigor as the need for defense of territory and food supply from wandering mockingbirds increases. We regard these notes as the winter equivalent of the summer growls. During November the song subsides but the chips and squawks continue much as before. These latter decrease markedly during December as do also the raids of the invaders.

During the winter season, with the exception of a short time at the beginning and at the end, and at times when there is no stress of battle in the air, the males may sing a softer more subdued song which probably should be considered the same as the happy, contented-sounding song of the summer.

**Night songs.**—During the summer the males, presumably, often sing at night. Some of this is the typical daytime song but much of it consists of short phrases repeated several times as though they were being practiced. Sometimes these short phrases are imitations of the notes of other species.

During the winter each bird may give a series of loud chips or a short, loud song several times during the night. These outbursts are often answered by the neighboring birds and thus extend outward in waves as they do in the daytime. The birds can be identified, of course, only by the positions from which their notes come.

**Songs of the females in summer.**—The females are quiet in the summer season. They join in the *hew-hew* notes and the rasping notes of the pair in early summer.

**Songs of the females in winter.**—Beginning about mid-September, as the depression of the molt wears away, the females sing a soft, faint song which can scarcely be distinguished from the song of the immatures. It is sung during the middle of the day from within low, thick shrubbery, each female always singing from the same place which also, in the case of a mated female, is the place that her mate sings a similar, faint song at this time.

About this time the females occasionally give slow, separated chips, evidence of intention to defend their territories, which soon give way to the rapid chips, harsh squawks and, with some of the females, short, loud songs as previously described for the males at this time.

**Songs of the immatures.**—The young birds sing a faint, soft song quite without imitations of other bird songs but distinctly a mockingbird song. They seem absorbed in the production of song and sing, usually at mid-day, for several days and then disappear. While singing the birds perch in low, thick shrubbery, mounting higher as the days go by but never do they sing from tree tops or other such high perches. At least some individuals sing before, during, and after the molt.

The immatures that want to take up a territory begin, about this time, a monotonous, seemingly everlasting series of slow, separated chips, always given from the same place. If the ownership of the territory is successfully established, the immature, even though it may be a female, takes up the rapid chips, harsh squawks and loud songs about the same time that the adult birds do so.

**Why do mockingbirds sing?**—It is customary to think and speak of birds singing because they are happy as we understand happiness. This may, in part, be true but as we become better acquainted with our mockingbirds we have a growing conviction that little if any of their singing is merely for the pleasure of creating the song or is an expression of peace and contentment with the surrounding world, but rather that all songs, or at least most songs, are uttered for vital, practical purposes.

## APPENDIX

**Analysis of trapping records.**—During the nine years and two months (Nov. 2, 1924 to Dec. 31, 1933) since bird-banding operations were started at our station 421 mockingbirds have been banded. Of these, 268, or 63.7%, were never recaptured and 153 were recaptured a total of 870 times. One was recaptured 261 times

TABLE 1  
MOCKINGBIRDS  
Summary of Ten Years of Banding

Number of Birds	Calendar Years											Total
	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933		
1. Banded	1	10	31	9	44	79	89	15	16	177		421
2. Recaptured from birds banded in previous calendar years	0	1	3	6	5	9	10	5	8	20		67
3. Total captures (Items 1 + 2)	1	11	34	15	49	88	99	20	24	197		488
4. Captured as immatures	0	1	12	2	29	58	22	4	3	136		267
5. Captured as adults	1	10	22	13	20	30	27	16	21	61		221
Number of Captures of Birds												
6. Recaptures of birds banded during the year	4	9	17	8	192	55	15	5	58	144		507
7. Recaptures of birds banded previous years	0	5	4	31	27	167	29	7	25	68		363
8. Total captures (Items 1 + 6 + 7)	5	24	52	48	263	301	83	27	90	289		1291
9. Recaptures of no. 357909	—	—	—	—	159	102	—	—	—	—		261
10. Total captures excluding item 9 (8-9)	5	24	52	48	104	199	83	27	99	389		1030
11. Average captures per bird trapped (10÷3)	5	2.2	1.5	3.2	2.1	2.3	1.7	1.4	4.1	2.0		2.1
Birds Banded in Year Indicated and Recaptured as Shown Below												
12. Never	0	4	24	6	33	56	28	9	6	102		268
13. At least once during period (12 + 13 = 1)	1	6	7	3	11	23	11	6	10	75		153
14. Percentage never recaptured	0	40	77	67	75	71	72	60	38	58		64
15. During calendar year of banding	1	5	6	3	0	18	10	4	7	75		137
16. Only during day of banding	0	0	0	0	0	1	1	0	0	3		5
17. Only during first week after banding	0	1	1	1	1	7	5	0	1	34		51
18. Only during first month after banding	0	3	1	1	3	10	6	0	2	64		90
19. Only during first three months after banding	0	3	1	2	5	10	7	0	2	73		103
20. Only during first six months after banding	0	4	1	2	5	12	8	3	3	75		113
21. Only during first twelve months after banding	0	4	2	2	5	14	8	3	6	75		119
22. After first twelve months after banding	1	2	5	1	6	9	3	3	4	0		34
23. Only after first twelve months after banding	0	1	1	0	2	3	1	0	2	0		10
24. Once during period covered	0	1	1	1	1	9	5	3	2	40		63
25. Two to five times during period covered	0	4	2	1	6	7	5	0	3	33		61
26. Six to ten times during period covered	1	0	1	0	1	5	1	2	2	2		15
27. Eleven to fifteen times during period covered	0	1	0	0	1	1	0	1	2	0		6
28. Sixteen to twenty times during period covered	0	0	2	0	1	1	0	0	0	0		4
29. Twenty-one to thirty times during period covered	0	0	1	0	0	0	0	0	0	0		1
30. Thirty-one and more times during period covered	0	0	0	1	1	0	0	0	1	0		3

in 21½ months, another 47 times in 16 months and another 46 times in 25 months. No other was recaptured more than 30 times and only 29 were recaptured more than 5 times. Excluding the high three, 150 were recaptured 516 times, an average of 3.4 times each. Taking into account the total number banded and the total recaptures the average number of recaptures is 2.1; but if the high three are excluded as exceptional, this average drops to 1.2 recaptures per bird. One hundred and nineteen were recaptured only during the first twelve months after banding, 34 were recaptured after the first twelve months after banding, and of these, 10 were recaptured only after the first twelve months after banding. Table 1 gives these and many other figures both for the total period and for the individual calendar years.

The first five items of Table 1 show the following story in regard to the calendar year 1928, and parallel stories for the other years. During that year 44 mockingbirds were banded and 5 which had been banded in previous years were recaptured, making a total of 49 individual birds that were trapped that year. Of these, 29 were immature and 20 were adults. Items 6 to 11 show that some of the 44 birds banded during the year were recaptured a total of 192 times and during the same time some of the 5 that had been banded during previous years were recaptured a total of 27 times making a total of 263 captures for the year. (The sum of items 1, 6 and 7.) Since mockingbird number 357909 was retrapped an unusually great number of times its recapture records, item 9, are excluded to avoid the decided hump in the curve of total captures which they would otherwise make and then item 11 (item 10 divided by item 3) shows that the average for the year was 2.1 captures per mockingbird trapped during the year. Items 12, 13 and 14 show that 33, or 75% of the 44 birds banded, were never recaptured after banding and that 11, or 25%, were recaptured at least once during the period covered by this analysis. Item 15 shows that 9 birds banded during 1928 were recaptured during that year. It was these 9 birds that were recaptured 192 times during the year, as shown by item 6 or, excluding number 357909, 8 of them were recaptured 33 times during the year (item 6 minus item 9). Items 16 to 23, inclusive, give the numbers of those birds banded in 1928 that were recaptured during different intervals of time. By referring to items 1, 12, 21 and 22 it is seen that of the 44 birds banded 33 were never recaptured, 5 were recaptured only during the first twelve months after banding and 6 were recaptured after that twelve months period, and item 23 adds that 2 of these 6 birds were recaptured only after and not during the twelve months. Items 24 to 30, inclusive, give the numbers of those birds banded in 1928 that were recaptured various numbers of times during the total period covered. The sum of all these items is equal to item 13, the number of birds banded in 1928 and recaptured at least once during the total period.

Table 2 shows the number of mockingbirds banded each year, the number recaptured from each year's banding during that and subsequent years, the individual identity by letters of the various birds within the group recaptured from each year's banding and the total number of recaptures for that group during the banding year and subsequent years. Thus in the year 1925 ten birds were banded, five of them, individuals a, b, c, d and e, were recaptured a total of 9 times during that year. During 1926 three of these original ten individuals, a, b, and f, were recaptured a total of 4 times and during the seven subsequent years individual "a" was recaptured 3, 1, 2, 2, 1, 1, and 1 times, respectively. The interesting information here given for this group of birds is that individual "a" was captured a small number of times each year for 9 years. This is the bird referred to in the introduction. Our records show that this bird was an adult when banded and hence it was at least 10 years old when captured in 1933. Further, they show that the captures of the various years all occurred

TABLE 2  
MOCKINGBIRDS

Summary of Trapping Records of Birds Banded Each Year Including the Recaptures of these Birds During the Year of Banding and Subsequent Calendar Years

Recaptures During Calendar Years													
Year banded	Number banded		1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	Totals subsequent to year of banding
1924	1	Individuals	1a	1a	1a	0	0	0	0	0	0	0	1
		Total Recaptures	4	5	1	0	0	0	0	0	0	0	6
1925	10	Individuals		5abcde	3abf	1a	1a	1a	1a	1a	1a	1a	3
		Total Recaptures		9	4	3	1	2	2	1	1	1	15
1926	31	Individuals			6a..f	5abdfg	3abf	3acf	1a	0	0	0	5
		Total Recaptures			17	28	15	12	3	0	0	0	58
1927	9	Individuals				3abc	1a	1a	0	0	0	0	1
		Total Recaptures				8	11	32	0	0	0	0	44
1928	44	Individuals					9a...i	4abik	2ah	0	0	1j	6
		Total Recaptures					192	121	2	0	0	2	125
1929	79	Individuals						18a..r	6agrstv	1t	2at	6abjuvw	11
		Total Recaptures						55	16	1	6	13	36
1930	39	Individuals							10a...j	3aij	1i	3hik	4
		Total Recaptures							15	5	2	4	11
1931	15	Individuals								4abcd	4cdef	3cdf	4
		Total Recaptures								5	16	6	22
1932	16	Individuals									7a..g	6efghij	6
		Total Recaptures									58	42	42
1933	177	Individuals										75	75
		Total Recaptures										144	144

Each bird recaptured from the group banded in any one year is given individual identity by a letter after the number of recaptured birds in that and subsequent years. The individual represented by a letter in the group banded in one year is not the same as the individual represented by that same letter in the group banded in any other year.

between April 13 and July 3, inclusive. In this same manner the years of recapture of all the other individuals can be read from this table. Of course, the individual represented by a letter in the group banded in one year is not the same as the individual represented by the same letter in the group banded in any other year.

Pasadena, California, February 15, 1934.

## THE BREEDING STATUS AND MIGRATION OF THE CASPIAN TERN IN UTAH

WITH TWO ILLUSTRATIONS

By C. LYNN HAYWARD

While scattered references to the breeding of the Caspian Tern (*Hydroprogne caspia imperator*) in Utah are to be found in ornithological literature, little definite information has, to the knowledge of the writer, appeared in print concerning the nesting status and migration of this species in this intermountain region. Bent (1921, p. 210) refers to this bird as breeding "in North America in widely scattered areas," but makes no specific mention of the Utah nesting colonies. It is for the purpose of bringing together such of these scattered references as the writer has been able to locate, as well as to place on record some more recently acquired information, that this paper is written.

Credit is due Mr. Robert G. Bee for much of the contained information as well as for the use of the photographs which were taken by him. Other individuals have also supplied information which is duly acknowledged in the course of the paper.

**Breeding Status.**—Probably the first published record of the Caspian Tern in Utah was that of Henshaw (1874) who reported it as a fairly common summer bird and mentioned its breeding within the state. Ridgway (1877, p. 639) states that "this powerful tern was more or less common . . . among the marshes near Salt Lake City in June and July." Although this writer makes no specific mention of the breeding of the bird, the presence of the species in considerable numbers at that time of the year would indicate that it was probably nesting near-by.

So far as more definite published records are concerned, the breeding of the Caspian Tern within the state of Utah has been noted only in two localities: Hat Island of Great Salt Lake and Rock Island of Utah Lake.

Palmer (1916) states that when he visited Hat Island in mid-May, 1915, he found a small colony of nesting Caspian Terns. Allee (1926) made mention of Palmer's reference, but did not find the birds breeding there when he visited the same island in mid-July, 1925. It is possible, however, that the nesting season was over at that late date.



Fig. 24. Nest and eggs of Caspian Tern on Rock Island, Utah Lake, June 4, 1928.

Photograph taken by R. G. Bee.

Just how extensive the Hat Island colony has been and how long it has existed is not known to the writer, but apparently it is not to be found there at the present time. Woodbury and Behle (1933) in their study of the breeding birds of the islands of Great Salt Lake make no mention of the Caspian Tern, and Dr. Woodbury in a recent letter assures me that they are not at present breeding upon any of the islands.

Considerably more data concerning the breeding colony at Rock Island, Utah Lake, are available, since this breeding colony has been under observation for a number of years. This island is located toward the southern end of the lake. Its area varies greatly from year to year and even from month to month, since the level of the water fluctuates. It is said to have become completely submerged in years when the lake was very high, but the droughts of the past few years have reduced the lake to such a low level that the island now comprises a large area. The island is oval in general outline, with a long narrow reef extending southward and a small inlet at the northern end. It is basically composed of travertine rock and is strewn with boulders, gravel and sand. There is a sparse growth of native vegetation including some patches of willows near the center of the island.

The breeding colony of the Caspian Tern apparently has been in existence on

this island constantly for many years, and, although diminished in numbers somewhat within the past few years, still existed when the island was visited in May, 1934.

The only published record that I have noted of the breeding of this bird on Rock Island is that of Cottam (1929, p. 9) who states that they are "fairly common from April 20 to September 20" and that they breed on "Rock Island from May 5 to June 1."

Dr. Vasco M. Tanner and Mr. Clarence Cottam visited the island on May 19, 1927, and found a colony of considerable size breeding there at that time. A few nesting California Gulls (*Larus californicus*) were also noted on that date. Dr. Tanner again visited the island on May 5, 1934. He states that the terns were much less numerous than on the first visit, but that the gulls had greatly increased in number. Two sets of eggs of the terns, one of three and one of two, were collected on this latter date and are now in the collection of the Brigham Young University.



Fig. 25. Portion of Rock Island, Utah Lake, showing several nests of Caspian Tern, June 4, 1928.

Photograph by R. G. Bee.

The records of Mr. Robert G. Bee are for the years 1928 to 1933, with the exception of 1929. In this latter year the island was visited by game wardens and most of the nests and eggs were destroyed.

Mr. Bee on his visit to the island on June 4, 1928, observed approximately thirty nests of the terns. In his notes he says: "The nests, on the south side of the reef, were slight hollows made by the birds in bare gravel. A few nests were observed on the opposite side of the reef, which were lower and evidently less protected from the waves, as the nests were of weed stems crudely banked to keep the eggs from being washed away by the water. However, this arrangement was not entirely a success as there were a few eggs that had been tossed out of the nests and lay in the water." The eggs were mostly fresh at the time this visit was made and the sets ranged in size from one to three eggs.

On Mr. Bee's second visit to the island, on June 9, 1930, he saw only two sets of eggs of the Caspian Tern, but there was evidence that the birds had been harassed. On June 1 of the following year he saw no Caspians on the island and indications were that they had again been disturbed. Dr. J. W. Sugden visited the island on June 1, 1932, and found twenty pairs of terns nesting there.

On his visit to the island on May 28, 1933, Mr. Bee estimated that about



forty pairs of the Caspian Terns were nesting in company with about five hundred pairs of California Gulls. The writer in company with Mr. Elmer Johnson and Mr. Merrill Hammond was on the island about a week previous in the same year (May 20) and noted only about ten nests on that date. Apparently the breeding of the terns had just begun, for there were at that time many of the terns resting on the water near the island that seemingly were not participating in the nesting.

At the time of our visit to Rock Island on May 20, 1933, we found the tern nests located in rather close proximity to each other. They were, however, completely surrounded by the nests of the gulls and even mixed in among them to a large degree. Many hundreds of the gulls were nesting at the time, and the more or less advanced state of incubation of many of their eggs indicated that their nesting season had begun somewhat previous to that of the terns. The nests of the terns were built upon the island well above the level of the surrounding water. They were shallow depressions in the gravel or between the rocks and were sparsely lined with grass and weeds which were built up on the edges to form a rim about three inches high.

The nests of the terns were, as far as we were able to determine, identical with those of the gulls. This fact, together with the close proximity of the two, made it somewhat difficult to distinguish between them. The eggs of the two species are likewise very similar in their general appearance, although when compared in a collection the eggs of the tern appear somewhat more rounded and less pointed on the small end and the shell is slightly more rough to the touch. To assure ourselves of the correct identity of the nests it was necessary for one observer to watch the birds with glasses as they sat on the eggs while another approached the nests.

The terns were more shy than the gulls. When we approached near enough to frighten the terns from their nests the less fearful gulls would immediately pounce upon their eggs and attempt to destroy them. This would happen even within a few feet of us. Such a state of affairs necessitated a rather hurried inspection of the nests and an early retreat to a safe distance. The presence of these gulls in such great numbers in recent years has undoubtedly had a great effect upon the nesting of the terns on the island. Dr. Tanner states that when he first visited the island in 1927 there were few gulls nesting there. Since that time there has apparently been a steady increase in the number of gulls and a corresponding decrease in the number of terns.

In general appearance the eggs of the Caspian Tern that we have noted answer the descriptions and compare favorably with the plates given by Bent (1921). Mr. Bee gives the average size of 54 eggs taken on Rock Island at various times as 64.39 by 44.98 mm. The largest egg in his collection measured 69.85 by 45.47 mm. and the smallest 59.56 by 43.43 mm. Five eggs comprising one set of three and one of two in the collection of the Brigham Young University show the following measurements: 64.5 by 54.8 mm.; 61.0 by 42.2 mm.; 63.5 by 45.1 mm.; 60.9 by 43.4 mm.; 59.5 by 44.1 mm. The sets range in size from one to three eggs.

**Migration.**—Migration data concerning the Caspian Tern are rather meager as far as Utah is concerned. Mr. G. E. Mushbach and Mr. Archie V. Hull of the Bear River Migratory Bird Refuge have kindly sent me the following dates for first arrivals in the spring: April 24, 1930; April 18, 1931; April 13, 1932; April 25, 1933.

Cottam (1929) records the terns as being in Utah Valley from April 20 to September 20. Our own records show April 29, 1932, as the earliest date of arrival, at which time approximately 50 birds were seen on Utah Lake.

## SUMMARY

The above data indicate that the Caspian Tern has been a fairly constant nesting species in Utah for many years. Breeding colonies have been noted on Rock Island, Utah Lake, and Hat Island, Great Salt Lake. The size of the colonies has varied greatly from year to year, depending largely on the degree to which they have been disturbed by visitors to the islands as well as by nesting gulls. The birds apparently arrive in Utah about the middle of April and commence their nesting activities about a month later. Should their breeding grounds be left unmolested it is likely that they will remain here as a nesting species.

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RACIAL DIFFERENTIATION IN PASSERELLA (MELOSPIZA)  
LINCOLNII

WITH FOUR ILLUSTRATIONS

By ALDEN H. MILLER and T. T. McCABE

An initial interest in Lincoln Sparrows (*Passerella lincolnii*) occasioned by the finding of significant size differences has led us to inquire into the nature of races in this geographically variable species or rassenkreis. First, we desired to learn the degree to which certain variable characters were correlated in individuals. Could we expect constant linkage of characters in either the genetic or physiologic sense? Second, having found no correlation in many instances, it seemed important to analyze the mosaic of structural variants which characterize a geographic race. Questions arise whether natural race units truly exist in nature and, if they do, whether they are as neatly circumscribed as usually acclaimed. Third, we wished to point out certain types of individual variants, colonial differentiations and incipient geographic variation which might lead in the course of time and further change to the establishment of geographic races of the level of differentiation commonly accorded nomenclatural recognition. Fourth, it seemed desirable to describe geographic trends that

like the characters of individuals, often are not correlated, one trend running as a geographic cross current relative to another.

Lincoln Sparrows contrast with Song Sparrows, *Passerella (Melospiza) melodia*, and Fox Sparrows, *Passerella iliaca*, with regard to degree of geographic differentiation. The genera *Melospiza* and *Passerella* have been merged by Linsdale (Univ. Calif. Publ. Zool., 30, 1928, pp. 367-369; Condor, 30, 1928, pp. 349-351) in the interests of larger generic groups among the North American fringillids. *Melodia* and *iliaca* are two of the largest rassenkreise on the North American continent, each comprising over fifteen geographic races. *Lincolnii* has but three races, although it occupies a territory roughly equal to that of *iliaca*. Comparing in another direction, *Passerella georgiana* is undifferentiated geographically. Can it be said that *lincolnii* and *georgiana* are less plastic than *iliaca* or *melodia*? If they are, can one assume greater genetic variation, or potential for genetic variation, in *iliaca* and *melodia*? Before granting the existence of such inherent plasticity some other factors should be considered: (1) Migration is more prevalent and involves longer journeys in *lincolnii* than in *melodia* and *iliaca* (some exceptions), allowing more chance for mixture of breeding populations that might be in process of differentiation. (2) *Lincolnii* does not inhabit insular regions to so great an extent as do *melodia* and *iliaca*, especially in the northwest coastal region. (3) *Lincolnii* appears to be more restricted to a certain type of meadow-bog habitat whereas *iliaca* occurs in dry chaparral regions, in timberline scrub thickets, or in beaver swamps and streamside meadows, depending upon the race and population involved. *Melodia* may frequent salt water marshes, fresh water marshes, brushy canyon bottoms, etc. Lincoln Sparrows seem less versatile ecologically. This quality is, in one sense, a sort of lack of plasticity and may be genetically transmitted.

#### MATERIALS

We are indebted to the following persons for opportunity to study Lincoln Sparrows either in their personal collections or in the collections in their charge: Mr. J. D. Figgins, Colorado Museum of Natural History; Mr. J. H. Fleming, personal collection and that of the Royal Ontario Museum; Dr. Herbert Friedmann, United States National Museum; Mr. Lyndon L. Hargrave, Museum of Northern Arizona; Mr. Randolph Jenks; Mr. Joseph Mailliard; Dr. H. C. Oberholser, Bureau of Biological Survey; Mr. James L. Peters, Museum of Comparative Zoology; Mr. Kenneth Racey; Mr. James Stevenson; Mr. Harry S. Swarth, California Academy of Sciences; Mr. P. A. Taverner, Canadian National Museum; and Mr. E. R. Warren, Colorado College Collection.

Additional material in the Museum of Vertebrate Zoology and the McCabe collection brings the total of birds examined to 1078. Of this number about 40 per cent are birds collected on the breeding grounds. Birds were not considered to be "breeding" until after May 20 and in some cases even later. Most of the August birds were considered breeding except individuals taken late in the month without trace of molt. Limits of the winter period were arbitrarily set at November 1 and March 15; a few exceptions were made.

#### THE PRINCIPAL VARIABLE CHARACTERS

**Coloration of the head and back.**—In the feathers of the dorsum three color areas have been analyzed independently.

The black or dark-brown shaft streaks on the back have been assigned to three categories: broad, moderate, and narrow. Width of shaft streaks in feathers of the pileum is not linked with width of shaft streaks in the back feathers, and may be quite opposite. Slight differences of color in this stripe probably involve as great a differ-

ence in pigment deposition as striking differences in lighter hues (Rensch, *Kurze Anweisung für Zoologisch-systematische Studien*, 1934, p. 81), but are hard to evaluate.

The buff margins near the tip vary in width, in contrast, and, in essential color, from light tan toward yellowish, toward ruddy, or toward neutrality.

The intervening brown areas have been divided into two groups with several categories. The ruddy series starts with brown, followed by moderately ruddy and ruddy. The yellow series starts with the same brown, followed by moderately yellow and yellow.

Deceptive effects of contrast and of the relative strengths of colors may be created in many ways, including wear and fading. Especially striking is the "crushed glass" effect of marginal whitening, with its brilliant contrast, which may result from wear soon after molt and disappear with the extreme wear of breeding time.

**Coloration of the underparts.**—In some instances the colors of the underparts vary in agreement with those of the dorsal surface. A bird with yellow type of back usually has a decidedly yellow infusion in the breast band and on the sides, but brown- and ruddy-backed birds are alike beneath. There is in the breast of *lincolnii* no counterpart of the differentiation in marking and color encountered in *iliaca* and *melodia*.

**Wing length.**—This dimension is the most satisfactory quantitative character. Differences in averages of adjoining races amount to about 5 per cent with the total range of individual variation in a race no more than 7 per cent. We have measured wings of both sides and averaged them to arrive at a figure for each individual. The measurement was taken without straightening the primaries artificially.

**Other measurable characters.**—Tail length usually is closely correlated, individually and racially, with wing length. Races differ in average tail length to the same degree (5 per cent) but individual variation is higher with a range of 10 per cent. Because of the correlation with wing and because of the greater individual variation, tail measurements may be set aside as having no additional significance.

Tarsal length varies individually to the extent of about 10 per cent with averages of adjoining races and populations differing no more than about 2½ per cent. Bill length, measured from the nostril, is similar in its variations but it is not correlated individually, nor necessarily racially, with the tarsus. Tarsal and bill lengths do not correlate individually to a high degree with wing length. We have not been able to see any important variations in bill shape or in relative toe and claw length comparable to the pronounced differentiations in congeneric relatives.

#### THE TRANSCONTINENTAL BOREAL AREA (P. L. LINCOLNII)

**Newfoundland and Newfoundland Labrador region.**—Breeding birds of this region tend to be ruddier on the back and longer-winged than those from western regions in the area. The highest percentage of ruddy-backed birds occurs here, the ruddy category diminishing from 58 to 31 to 8 to 4 per cent in regions progressively farther westward (see table 1). Wing measurements of males average 2 mm. longer than those of the adjoining Quebec-New Brunswick-Nova Scotia region. To show the nature of this geographic differentiation graphs have been constructed setting forth the frequency distribution of size and color categories. The graphs show that correlation (linkage) of these two features is lacking (fig. 26). The heterogeneity of the population is apparent; nevertheless, it is no greater than in many other populations in the *rassenkreis*. Tail and tarsal length are slightly greater than in western regions, whereas bill length is not greater than in areas immediately to the west. Tail correlates with wing but tarsus does not.

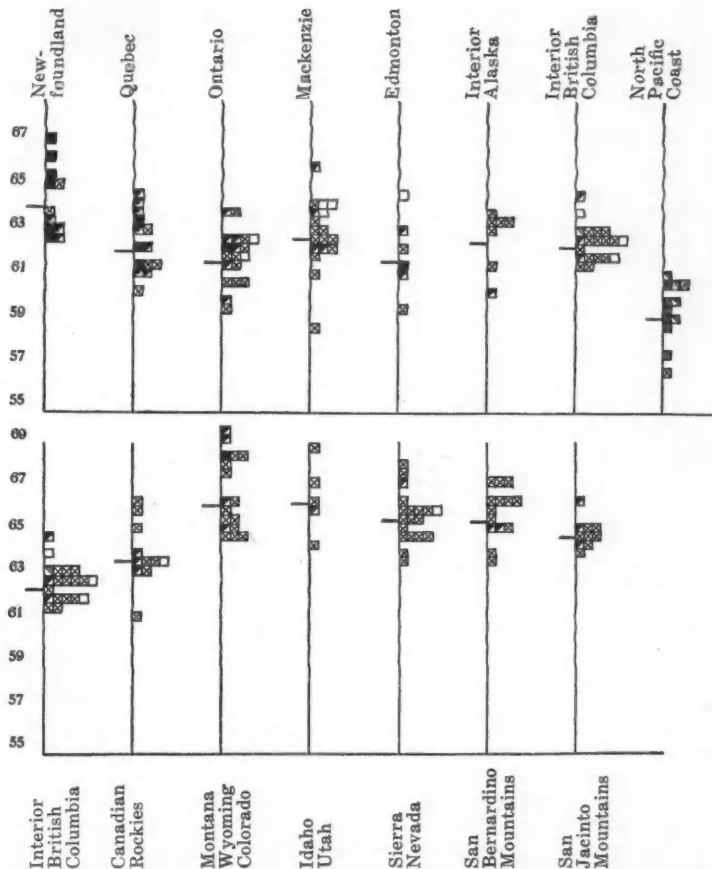


Fig. 26. Graphs showing occurrence of wing length and back color types in different regions. Each square denotes a breeding male bird. Black squares represent ruddy back; half black squares, moderately ruddy; squares with crosses, brown; open squares, gray-brown. Vertical positions of squares indicate wing length in millimeters. Heavy lines at left of vertical lines mark average wing length.

Practical means for the separation of birds from the Newfoundland and Quebec regions or the Newfoundland and Ontario regions do not exist. Separation on the basis of wing or color of back or the two in combination can effect only about sixty per cent segregation. This is below the limit of nomenclatural practicability. Nevertheless, the Newfoundland population presents all qualities of a weak geographic race. If its condition were slightly more homogeneous and there were a little greater segregation of characters geographically, a clearly defined geographic race would result. The northeastern maritime area, which is a region where many animals are represented by distinct races, supports a group of Lincoln Sparrows which seem either to be evolving into a race from individual variants or which represent a race once existent that is being obliterated by intermixture from the west. The hypothesis

that this is a nascent race is preferred by us because the characters of the birds of this region are not unknown in birds from the opposite side of the continent. If these character types once were limited principally to the east coast, it is unlikely that they could have become so widely and generally dispersed at the present time.

An interesting group of twelve September and October birds from New England gives every indication of representing the Newfoundland breeding population in southward migration. In this group seven ruddy individuals are included and the wing average for males is equivalent to the average for Newfoundland breeding birds.

**Quebec-New Brunswick-Nova Scotia region.**—The sample from this area (see map, fig. 27) in some respects is intermediate between those of Newfoundland and Ontario. The latter is more nearly typical of populations from the remainder of the transcontinental boreal area. In the Quebec region wing length, and also bill and tarsal length, drop nearly to the value for Ontario birds, but the percentage of ruddy types is half way between the Ontario and Newfoundland groups. Diminution in the ruddy category occasions an increase in the moderately ruddy and brown categories (see table 1). The most instructive fact in connection with this intermediate population is that back and wing alterations have not been coincident geographically, the wing changing more abruptly than the back color in the westward direction. Such a condition is entirely possible since the characters are not linked.

TABLE 1  
Distribution of back types in per cent (transcontinental boreal area),  
including both males and females

Region	Number of individuals	Ruddy	Moderately Ruddy	Brown	Gray-brown
Newfoundland .....	12	58	33	8	0
Quebec .....	16	31	44	25	0
Ontario .....	24	8	30	54	8
Mackenzie .....	22	4	18	65	13
Alberta .....	28	4	21	47	28
Interior Alaska .....	11	0	18	82	0
Interior British Columbia.....	28	4	21	65	10

**Ontario region.**—The sample from this region comes largely from eastern Ontario, south nearly to Toronto which marks the southern limit of breeding in this sector. As a population characteristic of interior continental regions the group contains a few birds with backs classified as gray-brown. This means that these birds are distinctly grayer than the brown type, not only as regards the basal brown areas of the feathers but also with respect to the margins. There is nowhere a population predominantly of this gray-brown type, but the condition is limited to the interior of the continent. Nowhere in the transcontinental boreal area do birds average smaller with regard to wing and tail than in the Ontario region. But minimum size of bill and tarsus is not encountered here.

**Mackenzie region.**—The drainage of the Mackenzie River from Great Slave Lake northward constitutes an area fairly well represented in our assembled breeding series. Unfortunately no satisfactory representation from Saskatchewan and western Manitoba is at hand. The precise limits of the breeding range in these provinces still need to be determined. The gap in distribution shown in our map is certainly not a real one.

Wing and tail length in the Mackenzie region is slightly greater than in the Ontario region but bill and tarsus are slightly shorter. The wing length frequency graph leaves little doubt that the difference in average wing length is real, that is, it is not the result of chance sampling, for the representation is uniformly higher than the Ontario group. The Mackenzie region is high in brown-backed types. These differences are of little consequence except as they illustrate slight changes in the mosaic of characters in different localities.



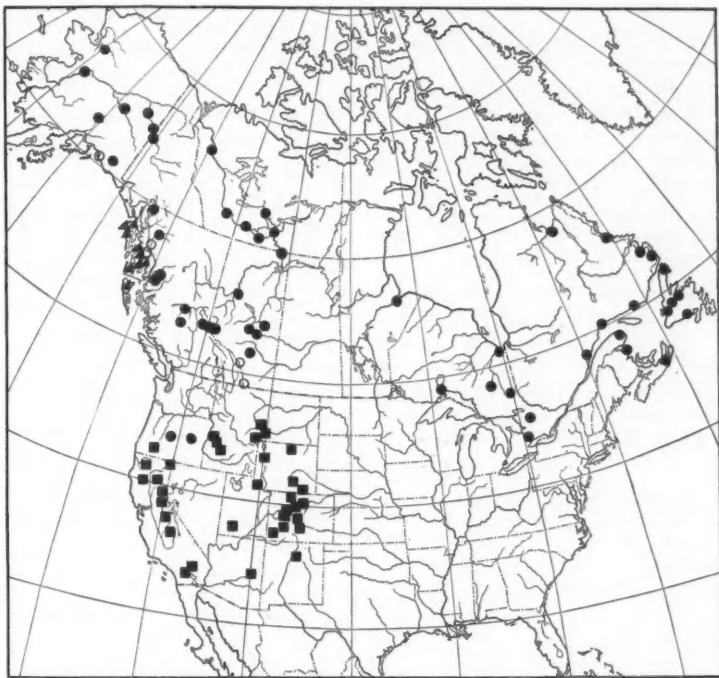


Fig. 27. Localities from which breeding Lincoln Sparrows were examined. Dots represent *P. l. lincolnii*; triangles, *P. l. gracilis*; squares, southern montane race; circles, intermediates.

**Edmonton-Peace River region.**—A small number of skins, most of them from near Edmonton, Alberta, demonstrate the trend of variation in the southwest sector of the plains of Canada. Averages for wing, tail, tarsus and bill are low, but the sample is not adequate to rule out error in sampling. This small region has been combined with the region along the east face of the Canadian Rockies for purposes of back color analysis. Combined they display the peak of occurrence of the gray-brown back type. Ruddy and moderately ruddy categories remain about the same as in the Mackenzie region, brown declining on account of the increase in gray-brown.

The occurrence of the largest proportion of gray-brown birds in this region is suggestive of light-colored plains races of other birds that have differentiated here. It presents a case of slight differentiation, even less than in the Newfoundland region, in which a special phase of coloration attains a frequency no greater than 28 per cent and in which there are no parallel size differences. Nevertheless the character, appearing in these low percentages, is correlated geographically just as are other more prevalent characters in other areas. Is this condition not another potential race? Is it in process of accentuation, and if so, through what mechanism?

**Interior Alaskan region.**—This region comprises chiefly the Yukon Valley and the mountains south of it but does not include the immediate coast from Prince William Sound southward. The sample from this region is small. In measurements

it agrees with the Mackenzie group and the predominance of brown-backed types is even greater. There is complete absence of the gray-brown plains type.

**Interior British Columbian region.**—This comprises the intermontane section from the Cariboo district north to the Skeena River; our specimens are chiefly from the Cariboo district in the valley of the middle section of the Fraser River. Perhaps because of the restriction of the area, the range of variation in wing length is relatively small. Averages for wing, tarsus and bill are similar to the Mackenzie group and the occurrence of back color types is almost identical. One moderately yellow-backed individual occurs. Thus the Mackenzie River Valley, the interior of Alaska, and the interior of British Columbia form an immense area within which only the slightest geographic variability can be detected.

**East face of Canadian Rockies.**—The population from Jasper Park southward is characterized by large size which is associated with its position adjacent to the even larger montane groups south of the United States border. Wing and tail reach average values comparable to those for the Newfoundland region, and tarsus and bill show some increase. Although the size in this group may be characterized as intermediate, it is distinctly closer in this respect to populations north of it than to those to the south. Coloration is mentioned in connection with the Edmonton-Peace River region.

**Summary of conditions in the transcontinental boreal area.**—Of the variable characters studied none seem to be linked (correlated) in the individual except wing and tail length. Wing length decreases westward to Ontario, then increases to a uniform level in the Mackenzie, interior Alaskan and interior British Columbian regions. It seems to be low in the vicinity of Edmonton but increases in the Canadian Rockies, particularly southward near the international boundary. Tail length correlates geographically with wing. The tarsus and bill decrease in length westward to Mackenzie, Alaska, and British Columbia, then increase slightly in the southern Canadian Rockies. Ruddiness of back decreases westward to Ontario, though less rapidly than does wing length, then diminishes slightly to a nearly uniform level in the other regions. Gray-brown back appears only in the interior of the continent with greatest concentration in Alberta. Incipient racial differentiation is suggested in Newfoundland and Alberta.

This in brief is the nature of the mosaics of characters in the different regions, and the various geographic trends. There is no mystic cohesion that makes this entire aggregation a precise unit. Like most geographic races it is nothing but a summation of many individual genetic patterns. It has somewhat indefinite limits of variability and the summation of patterns, or average, is correlated to greater or lesser degree with geographic area.

The limits of variability include individuals with ruddy, moderately ruddy, brown and gray-brown backs; individuals with narrow or moderately broad dorsal stripes; males with wings usually (90 per cent) no longer than 64.5 mm. nor less than 60.0 mm.; females with wings usually no longer than 61.0 mm. nor less than 58.0 mm.

Nomenclaturally this aggregation breeding in the transcontinental boreal area may be termed *Passerella lincolni lincolni*. The original description of *Fringilla lincolni* by Audubon (Ornithological Biography, 2, 1834, 539-541) was based on a specimen from Canadian Labrador (near mouth of Natashquan River, Quebec). This locality is well within the breeding area of the race as here conceived. Delimitation of the breeding area of *P. l. lincolni* along its western and southwestern borders will be explained as the adjoining races are discussed.

TABLE 2  
Average Measurements in Millimeters  
(Numbers in parentheses indicate number of specimens)

Region	Breeding males			
	Wing	Tail	Tarsus	Bill length
Newfoundland .....	63.8 (11)	55.7 (10)	20.8 (10)	8.0 (10)
Quebec .....	61.8 (15)	55.2 (13)	20.3 (15)	7.8 (14)
Ontario .....	61.3 (19)	54.6 (6)	20.2 (8)	7.8 (6)
Mackenzie .....	62.4 (18)	55.4 (18)	19.7 (18)	7.7 (18)
Interior Alaska .....	62.2 (7)	.....	.....	.....
Edmonton-Peace River .....	61.3 (6)	54.7 (6)	19.5 (6)	7.7 (6)
Interior British Columbia .....	62.2 (20)	56.4 (19)	19.9 (20)	7.7 (20)
Southern Canadian Rockies .....	63.2 (11)	57.2 (11)	20.0 (11)	7.8 (11)
North Pacific coast .....	59.0 (12)	53.0 (9)	19.2 (10)	7.5 (10)
Montana-Wyoming-Colorado .....	65.9 (18)	59.9 (19)	20.4 (19)	8.0 (11)
Idaho-Utah .....	65.9 (5)	.....	20.4 (5)	.....
Sierra Nevada .....	65.3 (24)	59.3 (16)	20.4 (19)	8.0 (17)
San Bernardino Mts. ....	65.2 (15)	60.2 (13)	20.0 (16)	8.0 (6)
San Jacinto Mts. ....	64.3 (10)	58.1 (5)	19.3 (13)	8.0 (7)
Region	Breeding females			
	Wing	Tail	Tarsus	Bill length
Ontario .....	59.3 (5)	.....	.....	.....
Mackenzie .....	59.1 (8)	.....	.....	.....
Interior British Columbia .....	59.1 (8)	53.1 (6)	19.2 (7)	7.6 (8)
North Pacific coast .....	56.9 (14)	52.4 (8)	19.1 (13)	7.6 (7)
Southern Canadian Rockies .....	59.9 (6)	.....	.....	.....
Montana-Wyoming-Colorado .....	61.5 (10)	55.7 (8)	20.1 (9)	.....
Sierra Nevada .....	61.1 (7)	55.9 (13)	19.8 (16)	8.0 (18)
San Bernardino Mts. ....	62.0 (7)	58.2 (7)	19.7 (7)	8.0 (6)
San Jacinto Mts. ....	62.4 (6)	.....	19.0 (7)	7.9 (5)

THE NORTHERN PACIFIC COAST AREA (*P. L. GRACILIS*)

Lincoln Sparrows breed in the southern Alaskan archipelago and south at least as far as the Queen Charlotte Islands. Brooks and Swarth (*Pac. Coast Avif.*, No. 17, 1925, p. 59) state that the species is "Rather rare on Vancouver Island; breeds locally in the mountains at the southern end of the island, probably at sea level at the northern end." McCabe has found that the birds do not breed at Bella Coola, British Columbia, at sea level, though they may in the coast range near-by at high elevations. The area under consideration is limited on the basis of available specimens to the archipelago from Queen Charlotte Sound north to Glacier Bay, Alaska, and east to include the mainland coast and the large river valleys and inlets. It does not include the highly elevated regions of the coast range mountains. There appears to be a continuous distribution of breeding Lincoln Sparrows northward and eastward into the interior of Alaska and British Columbia at a few points. But, some degree of isolation, ecologic and geographic, is provided by the mountains. Complete isolation from the interior may have existed during all or part of Pleistocene time.

The characters of the birds of this area display the same correlations found in *P. l. lincolnii*. Yellow and moderately yellow backs which replace ruddy and moderately ruddy backs show no linkage with size or with broad stripe, a category of stripe width not encountered in other areas but found in a large percentage here. The same range of individual size variation is encountered, but the actual values are all lower (2-5 per cent). The diminution in size compared with the adjacent interior of British Columbia is relatively abrupt, as is also the shift from ruddy types to yellow types (see fig. 26).

Differentiation of the birds of this area is sharper than that in any of the regions in the transcontinental boreal area. It has gone farther and involves more characters than the incipient differentiation in Newfoundland. Nevertheless, there is no one character that is present at all uniformly throughout the group. Most of the birds show a combination of broad stripe and yellowish or brown back color that, together with prominent light-colored edgings, make up a back pattern of strong contrasts. The median feather stripe is black and there is always some crowding together of stripes on the pileum that nearly obliterates the median gray crown region. Although these characters are not linked, rarely are enough of them absent that doubt arises concerning the origin of the individual from this breeding area.

	R	MR	B	MY	Y
NS	•	•••	••••• •••••	•••	
MS		•○	••••• •••••	○○○○○ ▲▲▲▲▲	▲
BS			○○○ ▲▲▲	▲▲▲▲ ▲▲▲○	▲▲▲

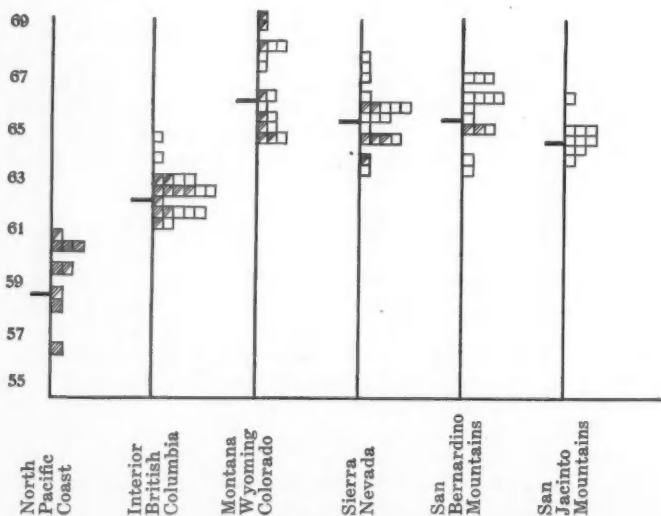


Fig. 28. Upper. Graph showing association of stripe and color characters in individuals of *P. l. gracilis* and adjacent populations of *P. l. lincolnii*. R, ruddy; M R, moderately ruddy; B, brown; M Y, moderately yellow; Y, yellow. N S, narrow stripe; M S, moderate stripe; B S, broad stripe. Triangles are breeding individuals from north Pacific coast area (*gracilis*); dots are breeding individuals from British Columbia; circles are late spring migrants from vicinity of Bella Coola, British Columbia.

Lower. Graphs showing occurrence of wing length and stripe width in different regions. Each square denotes a breeding male bird. Fully shaded squares represent broad stripe; half shaded squares, moderate stripe; open squares, narrow stripe. Vertical positions of squares indicate wing length in millimeters. Heavy lines at left of vertical lines mark average wing length.

To demonstrate the manner in which these characters occur in individuals we shall consider especially color and stripe width. Figure 28 shows the geographic distribution and association in individuals (not linkage) of these features. Brown back and moderately broad stripes are character types common to birds from interior British Columbia and this coastal area. But these two phases of the color pattern do not appear combined on individuals from the coastal area. Moderately yellow backs may appear in the interior regions, but, if so, in combination with narrow stripe. Brown back may appear on the coast, but in combination with broad stripes. We have little faith that these rules of occurrence of types would stand without exception if still more individuals were available, but they are valid generalizations and hold true in our material.

What now is the association of characters in geographically intermediate localities? The only large sample of birds that possibly could be used in this connection is a group of late spring migrants from near Bella Coola at the inner border of the coastal area in British Columbia. We presume this group represents a population about to breed in intermediate areas not far distant. In any event, in this group no combinations either of extreme coastal or extreme interior characters appear. On the correlation chart these birds are distributed so as to overlap the adjacent parts of the coastal and interior populations. Another, comparable, population of intermediates consisting of early fall migrants is at hand from the mainland coast of Alaska, chiefly the mouths of the Taku and Stikine rivers. This group is a little more predominantly of the coastal type and has some extreme examples with combinations of yellow and broad stripe.

True breeding birds from intermediate localities are scarce. Two such regions are represented. One of these is the Stikine River Valley that cuts through the coast range in central British Columbia. From Flood Glacier, at the eastern limit of the coastal area on the river (Swarth, Univ. Calif. Publ. Zool., 24, 1922, p. 138), there is one juvenile. Its dimensions fall near the upper limit of the coastal group. From Doch-da-on, just through the mountain range where interior faunal conditions prevail, there are: one adult that is broad-striped, moderately yellow and of minimum size for the coastal group; another adult that is moderately striped, brown and of size near the maximum for the coastal group and within the limits of variation of the interior population; a juvenile that is longer-winged than the maximum of coastal birds. Thus, one bird is predominantly of the coastal type, the other two nearer the mean of the interior group. One other locality on the Stikine, Sawmill Lake near Telegraph Creek, is represented by a pair of birds. This locality is still farther inland. The female is moderately yellow, narrow striped and above the maximum of coastal wing size. The male is brown, narrow striped with wing nearly equal to the average of interior birds.

Swarth (*op. cit.*, p. 260) found Lincoln Sparrows scarce along the Stikine bypass to the interior. These few samples point to diffusion of characters from the coast eastward in an irregular fashion that results in birds and populations possessing mixtures of characters.

A second intermediate locality is the region of Prince William Sound, Alaska (Grinnell, Univ. Calif. Publ. Zool., 5, 1910, pp. 404-405). This is far northeast of the Sitkan area and different faunally. A short distance inland, in the vicinity of Mount McKinley, Lincoln Sparrows are of the interior type. The following are the combinations of principal characters in five birds from Cordova Bay, Prince William Sound: ♂ brown, broad stripes, wing intermediate; ♂ moderately yellow, broad stripes, wing above maximum of coastal group; ♂ brown, moderate stripe, wing above average of *P. l. lincolnii*; ♀ brown, moderate stripe, wing intermediate; ♀ moder-

ately yellow, broad stripe, wing above maximum of coastal group. Apparently any mixture of characters can occur, but in general stripe width and color partake more of the coastal type, size of the interior type. Nevertheless, two brown, moderately striped birds occur, which character combination was not encountered on the coast farther south. A specimen taken by Osgood at Cook Inlet, August 28, is in all respects well within the character limits of *P. l. lincolnii*.

The name *gracilis* seems to us properly applied to the coastal race (see Oberholser, Proc. Biol. Soc. Wash., 19, 1906, p. 42). Kittlitz, the describer, mentions Sitka as the locality where his bird was encountered. There is little chance that he referred to any other race than *gracilis* as now understood. Migrants of *P. l. lincolnii* are not known to us from points this far from the mainland.

Limits of variability in the race *gracilis* include individuals with yellow, moderately yellow and brown backs and those with broad or moderately broad stripes on pileum and back. Brown back and moderate stripes do not occur in combination. Males usually have wings no longer than 60.6 mm., and females no longer than 58.0 mm.

#### THE SOUTHERN MONTANE AREA

This breeding area comprises the higher mountain ranges of the coast, Great Basin and Rocky Mountain series south of northern Montana, northern Idaho, and central Oregon. Lincoln Sparrows are limited to suitable meadows scattered through these ranges at elevations usually above 3000 feet and extending upward to 10,000 feet. Many of the mountain ranges are relatively dry and experience high maximum summer temperatures. The immediate habitat of the Lincoln Sparrows here is not especially different from that of populations to the northward, but precipitation in the breeding season is less than in the north Pacific coastal area and the transcontinental area exclusive of the plains. Southern outposts in the montane area are Pecos Baldy, New Mexico, the White Mountains, Arizona, and the San Jacinto Mountains, California. To the east distribution is of course sharply limited by the great plains. The western outpost is on the Yolla Bolly Mountains of California.

The chief features of birds of the area are large size and preponderance of brown, narrow-striped types in most of the subregions. Discontinuity of breeding range favors formation of colonies.

**Montana-Wyoming-Colorado region.**—Figure 26 shows the abrupt increase in wing length southward from interior British Columbia through the southern Canadian Rockies to Montana. Our Montana samples are all from southern Montana (see map) and are in no way different as regards average size from those of Colorado. Birds from Banff and Waterton Lakes, Alberta, represent a stage in intermediacy, but the principal change occurs south of these points.

Tail length is great, corresponding to wing length. Tarsal and bill length increase only to values equal to those in the Newfoundland region. There is no difference in back striping compared with the British Columbian birds and the proportions of color types is similar except for a nearly complete disappearance of the gray-brown type.

We have had few fresh-plumaged Rocky Mountain birds taken on the breeding grounds. Those that are available in several instances have a cold brown hue in the back, together with narrow, relatively neutral feather margins. The result is a back pattern of extremely low contrast that we will refer to as the dull type. Since this feature is visible only in fresh plumage we have not been able to set up a separate color category for it and all birds so colored are classed merely as brown. This type of coloration is more prevalent in other regions in the montane area.

**Idaho-Utah region.**—An inadequate representation, chiefly from Idaho, suggests



size and color characters equivalent to the foregoing region. The Idaho specimens are from the arid mountain section of the central part of the state and are dissimilar in size to specimens from the Blue Mountains of Oregon to the west. These latter (five) average in wing length slightly less than those from the Canadian Rockies. They no more than vaguely suggest intermediacy toward the larger-sized birds south and east of them. The Blue Mountain birds therefore fall entirely within the limits of variability of *P. l. lincolnii*. Whether or not the Idaho region is irregularly connected southward into northern Nevada and northeastern California has not been determined.

**Sierran region.**—This comprises the entire Sierra Nevada, the southern Cascade mountains from Crater Lake, Oregon, south, and the Warner, Siskiyou and Yolla Bolly mountains of California. No differences among birds from these localities within this region have been found. All size characters average much the same as in the Montana-Wyoming-Colorado region except for a slight decrease in wing length. Back color is somewhat more predominantly brown, with further reduction in ruddy and gray-brown types (see table 3). Narrow striped birds are more abundant (see fig. 28), a trend which is carried still farther in southern California. The peculiar dull type of back frequently is seen in fresh plumages.

TABLE 3  
Distribution of back types in per cent (southern montane area),  
including both males and females

Region	Number of individuals	Ruddy	Moderately Ruddy	Brown	Gray-brown
Interior British Columbia.....	28	4	21	65	10
Montana-Wyoming-Colorado ..	25	8	24	64	4
Sierra Nevada.....	31	5	18	75	2
San Bernardino Mts. ....	22	0	9	91	0
San Jacinto Mts. ....	16	0	25	75	0

**San Bernardino Mountain colony.**—A good representation from this breeding area includes a number of August birds in fresh plumage. Wing and bill size is the same as in the Sierran region. Tail averages slightly longer and tarsus slightly shorter. The ruddy and gray-brown types are wanting and moderately ruddy types are much fewer, so that 91 per cent of the group is brown backed. The population is almost uniformly narrow striped. Nearly all fresh-plumaged birds show the dull type of back.

**San Jacinto Mountain colony.**—This colony, near, but distinctly isolated from, the San Bernardino locality, displays certain peculiarities that are fairly reliably attested by a group of sixteen individuals. Here there is a uniform decrease in wing size in the males. This is not reflected in females, and curiously in both this group and the San Bernardino group the females are relatively large compared to the males. Bill length is the same as in the San Bernardinos and the Sierra Nevada but the tarsus has dropped to a remarkably low figure, being even smaller than in *gracilis*! This surprisingly small tarsus is found in males and females to equal degree. Ruddy and gray-brown categories are lacking, but the figure for "moderately ruddy" increases to equal that for the Colorado birds. Back stripes are without exception narrow. Thus is culminated a trend toward narrow stripe seen first in the Sierran region. This trend is paralleled by slight decrease in wing in the same regions. Comparison should be made with the trend in *gracilis*, however, in which increase in stripe width parallels decrease in wing length.

The San Bernardino and San Jacinto colonies are good examples of local differentiation and homogeneity of character in restricted isolated localities. They do not show any differences that can reasonably be associated with the special environments of these localities. The two mountains are similar faunally and florally. One is led to suppose that the colonies were derived from small, slightly different, parental

stocks that did not contain all the variety of character that may be found in large samples. Probably through isolation and interbreeding they have preserved their germ line in relatively homogeneous state. It also is possible that occasional depletion of the breeding stock has necessitated rebuilding of the population from a small residual sample (see Elton, *Animal Ecology*, 1927, pp. 186-187). Such circumstances would induce homogeneity and local differentiation depending on the nature of the residuum. These factors may be the explanation for the lack of ruddy and gray-brown types and, coincidentally, the different average wing and tarsal lengths and percentages of moderately ruddy birds in the two colonies.

With colonial differentiation progressed thus far, the ground work is laid for insular (boreal mountain top island) races. There is nothing to prevent the agencies which have created the existing colonies from effecting an even sharper differentiation. If differentiation is carried out in this manner, natural selection need not have been a contributing factor. This does not mean that it may not have been.

**Summary of conditions in the southern montane area.**—Wing and tail length again appear to be linked. These dimensions constitute the most uniform character throughout the area and fairly sharply delimit montane birds from those to the northward. There is some regional and colonial differentiation that consists in slightly reduced size toward the west. The region of most highly differentiated size (Colorado, etc.) shows least differentiation with respect to color (geographic cross-trends). The dull-colored back is more prevalent westward and, in California, southward. Narrowness of stripe shows a parallel trend. Ruddy and gray types diminish and disappear in the same directions. Tarsal length and moderately ruddy back show peculiar colonial differentiation.

The principle of character mosaic as the basis of the race concept applies to this montane group much as it did to the race *P. l. lincolnii*. The differentiation of the montane race from *lincolnii* is comparable in degree to *gracilis* with respect to dimensions and is distinctly greater than the differentiation in Newfoundland. In the matter of color the montane race is well differentiated only at its southwestern extreme.

**Nomenclature of the montane race.**—These seems to be no name available for this race. We propose that it be called:

*Passerella lincolnii alticola*, new subspecies

The limits of variability of this race include males with wing lengths usually (about 90 per cent) not less than 64.0 mm., averaging 65.2 mm., and females not less than 60.5 mm., averaging 61.5 mm. It includes chiefly birds with moderately ruddy or brown backs, rarely ruddy or gray-brown backs. The greatest number are brown-backed. Varying percentages of brown backed birds are of the dull brown type with reduced light feather margins. Birds with moderately broad and narrow stripes are included, but the latter type predominates.

We deplore the sanctity that often shrouds the type specimen in current systematic treatises. In the course of nomenclatural bickerings the type specimen has certain values which bespeak its careful preservation, but its scientific value in modern ornithology is, in our opinion, not great. The inability of a single type specimen to characterize a race mosaic is patent. There is no such thing as a specimen typical of all phases of the race or of the species. At best, a type is a form of insurance—a point of reference to turn to only in the event that the analysis of a newly described form is entirely inadequate. The type continually should be viewed in proper perspective and should not be allowed to overshadow and distort the true picture of the group of animals concerned. There is no doubt that preoccupation with the type specimen, even in familiar fields with abundant material, can create a working tradition which

disregards the complete character of the breeding population and misses the point of the study of geographic variation. Often, under modern conditions, we can imagine that a type locality without a type specimen would be a desirable arrangement where geographic races are involved.

To propose some definite type specimen we can do not more than select an individual from some one subregion in the range of the race and designate what category

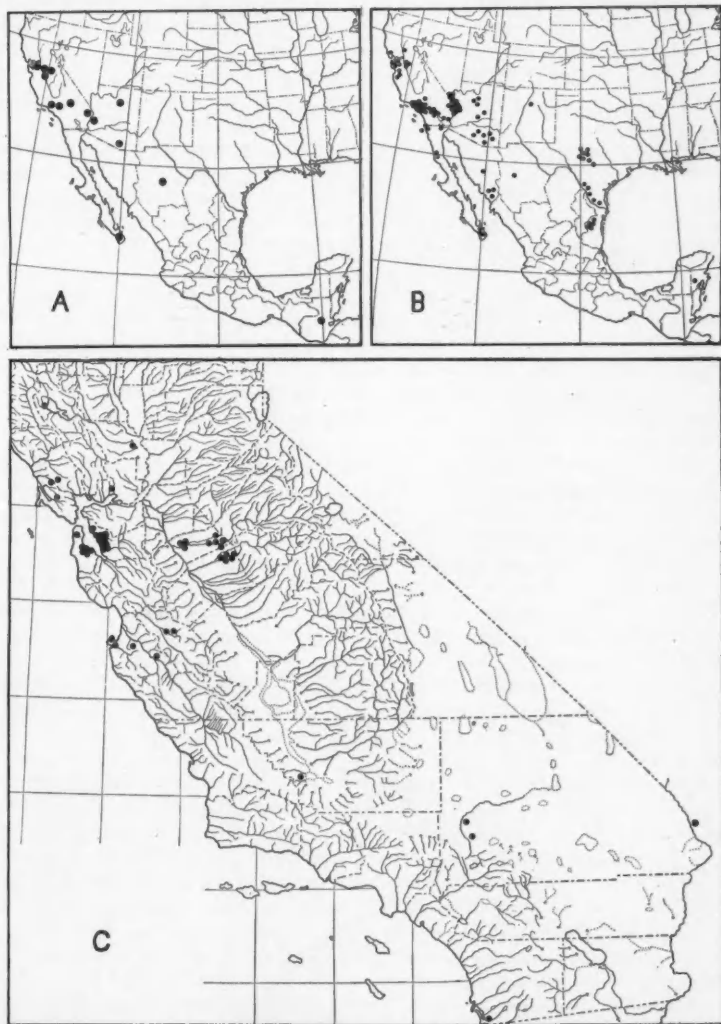


Fig. 29. Winter distribution of races of Lincoln Sparrows based on strongly characterized specimens only. Each dot represents a single individual. A, *P. l. alticola*; B, *P. l. lincolnii*; C, *P. l. gracilis*.

of color, stripe width and size it represents in our concept of the race pattern. We have chosen no. 36111, Mus Vert. Zool., ♂ adult, Bluff Lake, 7400 feet, San Bernardino Mountains, San Bernardino County, California; collected August 28, 1905, by J. Grinnell. This bird had nearly finished the postnuptial molt. The tail is not yet full length but one of the wing feathers (6) that constitutes the wing tip is fully grown. Average length of the two wings is 66.5 mm., or about 1 mm. above the average for males of this colony and near the maximum. The bird is narrow striped, but not exremely so; it is brown-backed, displaying the cold brown hue previously described, combined with lack of contrasting margins. The bill is slightly below average, the tarsus above average for the sample from this colony.

#### WINTER DISTRIBUTION

Rather than court error by naming all winter specimens, we have selected for purposes of plotting the winter distribution only those birds that possessed combinations of characters which left no reasonable doubt as to breeding area to which they belonged. In no instance do we know of birds wintering on the breeding grounds. Occasionally individuals remain far north of the normal wintering range; as, for example, a bird taken at Kingston, Ontario, January 4, 1932.

*P. l. lincolni*.—Figure 29 presents a fairly complete picture of winter distribution in the western United States except for New Mexico and parts of Texas. Concentration of dots is likely to mean concentration of collecting activities. Nevertheless, the larger of the concentrations in California and Arizona, such as that along the Colorado River, we believe represent true concentrations of birds. Further collecting in Mexico doubtless would demonstrate a more general distribution than indicated.

This race has been reported by Griscom (Bull. Am. Mus. Nat. Hist., 64, 1932, p. 364) from Guatemala, but of course such a record does not preclude *alticola*, one of which we have examined from that country. Probabilities favor the occurrence of *P. l. lincolni* as now understood south to Guatemala. We have no information regarding details of winter distribution in the eastern United States additional to that which forms the basis for statements in the latest edition of the A. O. U. Checklist (1931, p. 536). One should not be misled into supposing that Lincoln Sparrows do not winter in the southern states because of absence of record localities on our maps.

In migration *P. l. lincolni* may appear on the southern British Columbian coast and it has been found in early spring on several of the islands of southern California.

*P. l. gracilis*.—This race is restricted chiefly to California in winter. It is most concentrated along the coast in the northern half of the state and in the Sacramento-San Joaquin Valley. Winter collections from these points are predominantly of this race whereas south of the Tehachapi strongly-characterized *gracilis* are almost wanting and *P. l. lincolni* is prevalent (compare figs. 29B and 29C). Outside of California *gracilis*-like specimens almost always are intermediate toward *P. l. lincolni*. Such is the case in Lower California where all the specimens of "*gracilis*" in the Museum of Vertebrate Zoology reported by Grinnell (Univ. Calif. Publ. Zool., 32, 1928, p. 177) fail to show enough character to warrant placing them on our map. Many of them we feel are closer to *gracilis* than to *P. l. lincolni* and probably have some genetic affinity with the former. The specimens reported by Griscom (*loc. cit.*) from Guatemala we have not studied. It is not impossible that the race winters this far south. We must re-emphasize the fact, however, that the greatest number and the most typical individuals winter in central and northern California.

Among migrants worthy of special note is one from 10 miles south of Cibola,

Arizona, on the Colorado River. It is clearly *gracilis*. Spring and fall migrant Lincoln Sparrows in the northern coast belt of California are chiefly of this race. In September *gracilis* has appeared in the Yosemite Valley, showing that the birds must move southward in the mountains, avoiding the dry, hot interior lowlands in the early fall. There is a fall migrant from Eagleville, Modoc County, California.

*P. l. alticola*.—This race is not concentrated like *gracilis* in winter but is scattered with *P. l. lincolnii* in the southwestern United States and Mexico. One specimen from Guatemala has been examined. Frequently this race winters in the lowlands near the mountains in which it breeds.

There are a number of examples of *alticola* that have been taken late in the fall migration or early in the spring that indicate probable wintering localities. The localities are: 10 miles east of Sanger, Fresno County, Palm Springs, Riverside County, and Los Angeles, California; Todos Santos, cape district, Lower California; 7 miles south of Bisbee and Patagonia, Santa Cruz County, Arizona.

Unequivocal examples of *alticola* sometimes appear mixed with groups of *lincolnii* in Colorado at the eastern base of the mountains in early May. Similarly, several *alticola* have been taken along the eastern and western flanks of the Sierra Nevada shortly before or after the breeding season.

#### SUMMARY AND CONCLUSIONS

Analysis of the mosaic of characters in breeding populations of Lincoln Sparrows (*Passerella lincolnii*) has been made. This mosaic has no precise limitations in pattern in a given race. In passing from one geographic race area to another, different characters come into prominence in the pattern, and occasionally new characters appear in varying proportions. These shifts in pattern, these differences in summation of characters, that are geographically correlated are all that mark the races. There are no other cohesive factors (except perhaps physiologic characters) that bind individuals into race units.

Three principal races were found, one, *P. l. lincolnii*, occupying the transcontinental boreal area, another, *gracilis*, the north Pacific coast area, and a third, *alticola*, heretofore unrecognized, the montane region of the western United States. Within these races incipient differentiation, correlated with geographic locality, was found that led in various stages from the level of individual variation to that of weak racial differentiation. The essential steps along the course of racial evolution seem to be illustrated. Colonial differentiation on isolated mountain tops in southern California presents a situation with potentialities for the evolution of insular races. Population fluctuations and isolation with resultant genetic homogeneity and preservation of a particular type of variant are likely factors in the establishment of the present condition and seem capable of augmenting the differentiation.

Trends of character differentiation have been traced geographically. The trend in two characters may be parallel and proceed at the same rate. More often two trends proceed at different rates and, though parallel in one region, may run counter to one another elsewhere. The large-sized *alticola* appears to controvert Bergmann's law of large-sized races in cold regions. During the breeding season *alticola* experiences greater maximum temperatures than *P. l. lincolnii* and *gracilis*. This does not rule out the possibility that a summation effect of moderate to warm daytime temperatures in northern latitudes may have more influence than the short midday maximum of the southern mountains.

Variable characters, except for wing or tail, do not appear to be linked. Birds from regions intermediate between race areas are not uniform blends of characters but usually present various mixtures of characters in the individual with the popu-

lation encompassing most of the range of variation in the two races concerned. Nevertheless, each character may "blend" from one extreme manifestation to the other. This is the sort of complex to be expected if two populations, already heterogeneous and with characters inherited through many sets of factors, are thrown together and interbreed.

Winter ranges of races of Lincoln Sparrows have been mapped. The race *gracilis* has a restricted winter range. The other two races are wide spread in winter, but with local concentrations where there are favorable conditions.

The amount of individual variation (presumably genetic) in characters appears to us to be of the same order as that encountered in Fox Sparrows (*Passerella iliaca*) and Song Sparrows (*P. melodia*). In Lincoln Sparrows there is no reason to believe that in any one type of character there is less raw material in the way of variation upon which natural selection may work in the production of races. There are, however, fewer characters that differentiate conspicuously. Such characters as ventral spotting, coloration of ventral spots, bill shape, length of claw of hallux, that differentiate in races of Song Sparrows and Fox Sparrows, have not done so in Lincoln Sparrows. Yet, the reason they have not may be that there has been no selective pressure, for clearly there is some individual variation in all these features in Lincoln Sparrows.

A sort of organic selection may operate in Fox Sparrows and Song Sparrows to induce diversification. For example, Fox Sparrows by temperament (probably hereditary) may be especially given to pushing into new regions and new habitats; certainly they appear to have accomplished this. The attempt to colonize would set up new habits in the individual and throw the bird under new selective influences so that racial evolution would be relatively rapid. The Lincoln Sparrow, on the other hand, by rigidly adhering to a certain ecologic niche for purely psychologic reasons (there might be others) would not differentiate greatly even though giving rise to variants upon which selection might work. The bird is not adventurous. Species that are aggressive in the sense of range expansion, geographically or ecologically, and yet not too adaptable individually, should form large rassenkreise. We can see in the natural history of the Lincoln Sparrow, then, factors which we think are partly responsible for lesser racial differentiation compared with its generic relatives.

*Museum of Vertebrate Zoology, Berkeley, California, January 17, 1935.*

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## CONTINENTAL LAND MASSES AND THEIR EFFECT UPON BIRD LIFE

WITH TWO ILLUSTRATIONS

By P. A. TAVERNER

It seems that no particular attention has ever been called to the effect that relative shape and size of the large continental land masses may have upon bird populations, especially of migratory species; yet an important relation exists between them. It is obvious that no population can increase permanently beyond the number that can be carried through the most difficult season. The amount of live stock that a ranch can carry is not measured by summer pasturage but by its winter resources. Similarly, no northern area can, except temporarily, possess more migratory birds than can be supported through the winter in southern quarters. No improvement in northern conditions can ever increase migratory bird populations



beyond the limits imposed by southern factors. Any large-area map shows that the possibilities of summer and winter ranges of many birds vary considerably. We are not thinking here of the different ecological conditions—the distribution and character of desert, marsh, forest, etc.—but of the fundamental differences in land areas. In the northern hemisphere these differ strikingly.

North America is triangular in shape, the broad base to the north, the pointed apex to the south. Land areas are immensely more extensive north than south, and



Fig. 30. Summer and winter ranges of Eastern American Robin.

their capacity for raising birds greatly exceeds that for wintering them.

Europe and Asia present a very different picture. Their combined outlines are approximately rectangular. Europe is particularly favored in this respect, for the land masses southward include the broadest part of the great continent of Africa and it is evident that birds of northern Europe have greater land areas available in winter than in summer. On the basis of relative land areas, southern Europe and northern Africa could return to northern latitudes more birds than can well be accommodated, or at least can fill northern regions to their full capacity. Contrary to North American conditions, the wintering area exceeds that of summer. Asia is slightly different. Southward it shows a slight taper and considerable expanses of water but in no such pronounced degree as does North America. Its great southern land masses promise far greater winter resources. Its facilities for migratory winter population are intermediate between those of Europe and America.

South America and Africa reverse North American conditions inasmuch as they present wintering areas that are enormously greater than summering areas. In fact the latter are so reduced as to hardly seem worthwhile exploiting by an extensive migrational system. It is not unlikely that this is the factor that has discouraged or prevented in the southern hemisphere the highly developed migrational movements that are so characteristic of the bird life of the north.

It has often been pointed out that in Europe bird conservation is generally disregarded and that everything that flies is pursued relentlessly as a legitimate object of sport and gastronomy. Yet in spite of this, Europe possesses more birds than does North America, where law, tradition and practice are to the contrary. Undoubtedly Europe's greater winter resources based upon the more favorable shape of its land masses is an important factor in producing this paradoxical state of affairs. North America cannot carry enough seed stock through the winter to populate the north to capacity and consequently cannot expect the same density of bird population as Europe, that can depend upon a sufficiency or a superabundance of seed. It is probable that these fundamental conditions explain to a large extent the

difference of attitude towards conservation on the two continents. The necessity for conservation of bird life obviously is greater in North America than in Europe or Asia.

In illustration of the peculiar American conditions, the summer and winter ranges of two birds typically affected, have been mapped—for the Eastern American Robin, *Turdus migratorius migratorius*, and the Common American Golden Plover, *Pluvialis dominica dominica*. These maps have been traced from an "interrupted homolographic equal area projection" that reduces the distortion involved in representing a spherical surface on a plane, to a minimum, so that the relative sizes of the parts indicated are not appreciably affected. In spite of the adaptability of the robin it clearly is impossible, even when the relative productivity of the two areas is considered, for the small winter quarters to support sufficient breeding material to populate to capacity the whole of the great northern area. In this particular case the adverse conditions are intensified by the fact that the wintering area is already utilized by a resident Southern Robin, *Turdus migratorius achrusterus*, which occupies an identical ecologic niche and whose competition reduces the number of intruders that can be accommodated. The case of the Plover is similar, though its



Fig. 31. Seasonal ranges of Common American Golden Plover; summer range in North America, winter range in South America.

seasonal ranges are separated by many hundreds of miles. In summer it occupies the great expanse of the widest part of the northern continent; in winter it is confined to the pampas in the constricted tail of South America. The two areas are strikingly different in size.

Of course this difference in continental shape will not affect all birds equally. Sedentary species may not be affected at all. With other species, differences in food productivity and ecologic conditions may in varying direction and degree compensate for differences in regional areas. But taking bird life as a whole, when ninety per cent of the birds of a great region periodically and of necessity have to be packed into a much smaller area already occupied by an intensely competitive population, and at the season of least productivity, factors are present that set definite and positive limits to population.

National Museum of Canada, Ottawa, Ontario, January 25, 1935.

## NOTES ON SOME BIRDS OF LOWER CALIFORNIA, MEXICO

WITH TWO ILLUSTRATIONS

By J. STUART ROWLEY

During the early summer of 1933, I had the pleasure of undertaking a rather extended trip through the peninsula of Baja California, Mexico, by automobile. This trip was made possible through the assistance of several institutions including the California Academy of Sciences, the San Diego Natural History Museum, and the Florida State Museum. I wish to express my gratitude to the several officials of these institutions and also to Vice-Governor Rodriguez and the Ruffo Brothers in La Paz, and to M. Marcel Réthaller of the Boleo Company at Santa Rosalía, all of whom were extremely hospitable and rendered valuable and appreciated service to us before and during our stay in Baja California.

Accordingly, with proper credentials, my companion, Mr. H. S. Kindrick, and I crossed the International border at Tijuana in early April. No attempt is made to record the observations of all the races of birds seen throughout the trip, but only of those concerning which noteworthy facts were obtained supplemental to the information given in Grinnell's paper entitled "A Distributional Summation of the Ornithology of Lower California" (Univ. Calif. Publ. Zool., 32, 1928, 300 pp., 24 figs.).

*Rallus beldingi*. Belding Clapper Rail. Through the cooperation of a native fisherman, an unusual Mexican who observed things in his daily routine other than fish, I was able to obtain, on May 3, a beautiful set of seven eggs, incubation commenced, from the mangroves near La Paz. This set is now in the collection of the Florida State Museum.

*Oreortyx picta confinis*. San Pedro Mártir Mountain Quail. Quite by accident, on June 11, a pack burro flushed a female from a nest containing ten eggs, incubation commenced, near La Grulla in the Sierra San Pedro Mártir.

*Lophortyx californica plumbea*. San Quintin California Quail. Several nests of eggs of this species were found, from near San Telmo to San Fernando. The nests were usually placed at the base of an agave, an abundant plant in that coastward strip, and many of the nests were found by carefully watching the exact spots whence the females flushed as we drove southward along the road. However, at San Fernando, where the vegetation is much different from that in the coastal country, nest locating was difficult. During our stay at San Fernando not one female quail was observed in the month of April, during our southward journey, with the exception of the individuals which were practically "kicked" off their nests. Males were plentiful, calling everywhere, but the females were apparently all commencing to incubate, and they remained on their eggs. I undoubtedly passed within a foot or two of many such incubating quail, completely unmindful of their presence as they would remain to the last second before flushing. Even a violent kicking of the brush under which a nest would later be found often failed to flush a sitting bird, as one nest containing twelve advanced eggs was found on a second "round" of such kicking.

Nests of the San Lucas California Quail (*Lophortyx californica achrustera*) were found at Miraflores in the Cape Region by this same "kicking" process, which is a tiring but effective procedure.

*Zenaidura macroura marginella*. Western Mourning Dove. According to Grinnell (p. 104) the breeding status of this species on the peninsula has been established as far south as Comondú, lat. 26°. I found this bird to be quite uncommon at Miraflores in the Cape Region during the month of May. While several pairs were observed at a watering place adjacent to camp, only one nest was located, that being typically constructed and placed in a low bush near fresh water. On May 12, the nest contained two fresh eggs, which were collected. Miraflores is approximately at lat. 23° 40', and this take proves that this species breeds to the extremity of the peninsula where fresh water is available.

*Cathartes aura septentrionalis*. Northern Turkey Vulture. Abundant visitors to our camp at Miraflores from dawn until dusk, patiently awaiting the opportunity to

seize flesh tossed from the skinning table. A nesting cavity located on a hill a few miles from our camp on May 17 contained two fresh eggs which I collected. This date, in comparison with breeding dates in southern California, is extremely late.



Fig. 32. La Laguna, Sierra de la Laguna, in the cape region of Lower California, Mexico.

*Parabuteo unicinctus harrisi*. Harris Hawk. While numbers of these hawks were seen throughout the peninsula, only three nests were located. One was thirty miles north of San Ignacio in a "joshua" tree and on April 24 contained two eggs slightly incubated; another near El Refugio, about lat.  $24^{\circ} 47'$ , in a cardon contained one slightly incubated egg on May 2; the third was found in a cardon at Miraflores and on May 17 contained three heavily incubated eggs.

*Falco sparverius peninsularis*. San Lucas Sparrow Hawk. While this hawk was seen rather abundantly, only five nesting cavities were located. Two held sets of two eggs, two of three eggs, and one of four eggs. All were in deserted woodpecker holes in cardons and in the topmost holes of each cactus. Also, each set represented a full complement, for incubation was well advanced. The sets were taken from May 11 to 15 in the neighborhood of Miraflores.

*Polyborus cheriway auduboni*. Audubon Caracara. Caracaras were well represented in the "carrion row" about our Miraflores camp. They had the vultures completely "cowed" and would often take a piece of meat away from a vulture. One caracara easily controlled the situation around a larger carcass where several vultures had been feeding, the vultures taking the background until the caracara had had his fill and departed. From May 8 to the 15th, inclusive, five nests were located near Miraflores, all containing eggs and all placed in crotches of cardons. No nests held more than two eggs and one contained only one; all were full complements.

*Pandion haliaetus carolinensis*. American Osprey. Two recently occupied nests were found on the mainland, both placed in cardons about one-half mile inland from the sea-coast. One was located near San Xavier on Santa Rosalia Bay, and the other inland a bit from the shore of Concepción Bay, on the Gulf. These seemed of interest since cardons are apparently unusual nesting sites for this species. On the ground below these nests were quantities of fish remains.

Genus *Otus*. Screech Owls. Screech owls were noted from San Fernando, lat.  $30^{\circ}$ , south to lat.  $29^{\circ}$ . Two specimens collected June 8 at San Fernando seem referable to *Otus asio cardonensis* (according to H. O. Havemeyer, MS). One individual was heard calling at a point about forty-five miles north of Punta Prieta, lat.  $29^{\circ}$ . No more were heard or seen from this point southward until one was heard calling in the cardons of the mainland directly opposite San Marcos Island, at about lat.  $27^{\circ} 25'$ .

This occurred on the return trip and since our flashlight batteries were well exhausted, the pitiful flickering light was insufficient to catch a movement or object, and our bird was not secured.

In the Cape Region about Miraflores, *Xantus Screech Owls* (*Otus asio xantusi*) were rather plentiful. Elsewhere in the Cape Region none was seen, and it is my belief that they were locally abundant about our Miraflores camp because of the water there and therefore the food supply. Of over a dozen individuals collected, the coloration of plumage ranges from a light gray to a dark gray quite similar to the southern California form, *Otus asio quercinus*. Regarding body size in the specimens collected, I found that the females varied surprisingly, while the males were noticeably and more constantly smaller. Likewise, the egg measurements varied noticeably. Five sets of eggs, one of four, two of three, and two of two eggs, were taken near this camp May 8 to May 20 inclusive, from woodpecker holes in cardons. The sets were complete in each case; the smallest egg measured 27x32 mm., the largest 31x35 mm.

*Bubo virginianus elachistus*. Dwarf Horned Owl. Mention is made of this species for the fact that a set of two eggs, heavily incubated, was taken from a cliff at San Fernando on April 19. This date seems exceedingly late for horned owl eggs, and might have meant a second attempt at nesting for the year. A nestling was taken from a nest at Miraflores on May 8.

*Glaucidium gnoma hoskinsii*. Hoskins Pigmy Owl. Only one individual was met with, this being an adult female taken from a cardon at Miraflores on May 7. This bird is now number 63307 in the Museum of Vertebrate Zoology. While observers in past years have considered it rather common, I consider this owl to be a difficult one to secure and am of the opinion that it is a rare bird now.

*Micropallas whitneyi sanfordi*. Sanford Elf Owl. Locally quite common near Miraflores and around Santa Anita, in the Cape district. Being quite noisy during the early evenings, it was easy to secure a good series by means of very light shot cartridges at close range. No nests were located.

*Geococcyx californianus*. California Road-runner. Road-runners were noted everywhere at the lower elevations. Numerous nests with eggs or young were found, particularly in the Cape district. Three eggs usually constituted a full set. The average egg size was 29x39 mm.

*Dryobates scalaris lucasanus*. San Lucas Woodpecker. Two nesting cavities of this bird were found in cardons. One, found April 30 at the south end of Concepción Bay, contained five slightly incubated eggs; the other, taken on the same day near Comondú contained three eggs advanced in incubation. These two sets are now in the Florida State Museum and the W. C. Hanna collections, respectively.

*Centurus uropygialis cardonensis*. San Fernando Gila Woodpecker. Five eggs, fresh, taken April 22, and three eggs, slightly incubated, taken April 21, both in cardons, at San Fernando, are the only entries of consequence in my notes. These sets are in the above mentioned collections, respectively.

*Centurus uropygialis brewsteri*. San Lucas Gila Woodpecker. Eggs were found at San Bruno on the Gulf side in late April; at El Refugio on the Pacific side in early May; at Miraflores in the Cape Region in the middle and latter part of May. Of interest in comparing the breeding activities of the two mentioned races of Gila Woodpeckers was the fact that the birds to the northward as far as San Fernando seemed to start breeding earlier than those to the southward. At El Refugio on the Pacific side, adults of *brewsteri* were noted feeding half-grown young in the nest on the first of May, while at Miraflores the majority of birds had not even laid when we left there May 21. According to comparative climatic conditions, this seems strange.

*Phalaenoptilus nuttallii* subsp. Poor-will. Four specimens of Poor-will were collected. They are now in the collection of Dr. Louis B. Bishop, who comments on them as follows: "The poor-wills I compared with two *hueyi* I have and found a strange state of affairs. Your no. 1126, female, from Miraflores, and no. 1196, female, (from) La Laguna, I refer to *hueyi*. . . Number 1228 female (from) San Fernando is quite different and must be *dickeyi*, and, strangely, no. 1182, male, (from) Miraflores, belongs with the last and not with the other two. This is not at all according to Grinnell's distribution."

Specimen no. 1126 was taken on May 7, and no. 1196 was taken on May 24; no. 1228 was collected on June 8, and no. 1182 was collected on May 16. All the birds were

paired off preparatory to nesting but the sexual organs in each were not developed sufficiently to indicate breeding.

According to Grinnell (*op. cit.*) the race *dickeyi* belongs to practically the entire southern territory of the peninsula from the Cape district northward to about lat. 30°; and *hueyi* is stated to be restricted apparently to the Colorado delta region. According to the occurrences of these two races now cited, at dates just a few weeks prior to actual nesting, the case is somewhat confused; more actual specimens must be collected to determine definitely their relative distribution.

*Chordeiles acutipennis inferior*. San Lucas Nighthawk. This bird was rather abundant near our camp at Miraflores, where several specimens were taken. Nowhere else in the Cape region were we able to secure specimens, although some were seen flying high in the Sierra de la Laguna. At San Fernando, to the northward, two specimens were taken on June 8. These, according to Mr. H. S. Swarth (MS), are referable to the race *inferior*. Apparently there has been some doubt as to the form occurring at this locality. These specimens (on which I carelessly switched the two respective labels) are now in the collection of the California Academy of Sciences.



Fig. 33. Summit of grade near San Fernando, Lower California. Note extension ladder for use in exploring holes in cardons. Cardons and cirios in background.

*Basilinna xantusii*. Xantus Hummingbird. Four nests of this species were found, three from the vicinity of San Bartolo, about lat. 23° 45', and the other at Miraflores. Three contained eggs, the other held young about a week old. The three having eggs were placed on branches overhanging water, but the one with young was overhanging a dry wash, with no water for a good half-mile. A number of individuals were noted in the canyon toward the Pacific a few miles from Comondú, but no nests were found there.

*Sayornis saya quiescens*. San José Say Phoebe. A full grown juvenal was collected on June 7, fifteen miles south of Punta Prieta, which settlement is exactly on lat. 29°. A nest containing three young was found in the ruins of the mission at San Fernando on June 8.



*Otocoris alpestris enertera*. Magdalena Horned Lark. A nest containing three fresh eggs was found at Santa Rosalia Bay on April 23. The bird was flushed by the roadside as we drove past. Horned Larks were rather abundant there.

*Aphelocoma californica hypoleuca*. Xantus California Jay. My notes show that on the last of April along the shore of Concepcion Bay on the Gulf, many nests of this jay were found, and without exception all contained newly hatched young. Then, after crossing the peninsula to the Llano de Yrais on the Pacific slope, no nests were found occupied, but young were flying about in nearly full plumage (specimen of such juvenal collected there). When we reached Miraflores, in the Cape district, nesting activities were just beginning and from May 10 to 19, inclusive, at this locality eight sets of two eggs each and five sets of three eggs were taken. Two eggs seemed the more common "full set," with three eggs rather uncommon, while no nests were found to contain more than three eggs or young anywhere the species was observed. Upward of fifty occupied nests were located. To the northward, at San Ignacio, only one nest was found to hold even eggs, three fresh being taken on April 27; the majority of birds were apparently just building here.

Thus, in summing up my observations upon these jays, the nesting season along the shore of Concepcion Bay on the Gulf around lat.  $26^{\circ} 45'$  was well advanced in comparison with nesting dates at both San Ignacio, near lat.  $27^{\circ}$ , and at Miraflores in the Cape Region at lat.  $23^{\circ} 30'$ , while on the more temperate and cooler Pacific side near El Refugio (slightly below lat.  $25^{\circ}$ ) the breeding activities were far advanced over those observed in any of the other localities. This seems the reverse of what one would expect; with warmer climatic conditions, nesting usually commences earlier. The same general conclusion was drawn with regard to the Gila Woodpeckers of the peninsula.

The most northerly point of observation of this jay was approximately twenty miles north of Punta Prieta, which is on lat.  $29^{\circ}$ . The smallest egg measured  $20 \times 27$  mm., the largest  $23 \times 30$  mm.

*Pipilo maculatus magnirostris*. Large-billed Spotted Towhee. Two specimens, both males, were collected near camp at Miraflores on May 13. Later, at La Laguna in the Sierra de la Laguna, this bird was found to be very common, but no nests were in evidence.

*Passerina versicolor pulchra*. Beautiful Varied Bunting. Locally well represented about our camp at Miraflores the middle of May. Specimens were taken there.

*Vireo solitarius lucasanus*. San Lucas Solitary Vireo. One nest found contained four slightly incubated eggs on May 6. This was on San Bernardo Mountain on the Gulf slope of the Sierra de la Laguna. Strangely, young flying about were noted at La Laguna on the top of the range, while this set was taken at a lower elevation and on the warmer Gulf side.

*Vireo huttoni cognatus*. San Lucas Hutton Vireo. A nest containing three eggs, incubation commenced, was found on the sierra above Miraflores on May 10. Both this and the precedingly mentioned set of eggs are now in the Florida State Museum collection.

*Toxostoma cinereum mearnsi*. Mearns San Lucas Thrasher. In the vicinity of San Telmo where a number of nests were found, these were usually placed in cholla cactus. On April 15, nests were found with eggs; sets were of two and rarely three, from slightly incubated to well advanced in incubation. No nests were found with young. The smallest egg measured  $20 \times 25$  mm., the largest  $21 \times 32$  mm.

*Toxostoma cinereum cinereum*. Cape San Lucas Thrasher. I believe that this bird is by far the most commonly met with as a breeding species at the lower altitudes of the Cape region. Dozens of occupied nests were found, from San Ignacio southward, but only one was found to contain more than three eggs, this being a set of four from San Ignacio. The smallest egg measured  $20 \times 26$  mm., and the largest  $27 \times 31$  mm.

*Toxostoma lecontei arenicola*. Santa Rosalia Leconte Thrasher. My notes record the taking of a badly worn male of this race on June 7 at a point forty miles north of Punta Prieta and decidedly interiorly from the coast. This is forty miles northward of lat.  $29^{\circ}$  and is of interest as extending the range from a narrow coastal strip to half way across the peninsula interiorly. This specimen is now in the collection of Dr. Louis B. Bishop.

*Heleodytes brunneicapillus affinis*. San Lucas Cactus Wren. While this form

was extremely common throughout its range, of interest was the fact that of some thirty-five nests examined, none contained more than three eggs or young, with the majority holding two. The same held true for *H. b. bryanti* to the northward, particularly at San Fernando and at San Telmo. Two nests of *H. b. affinis* were placed in old woodpecker holes, one in a cardon about twelve feet up, and the other in a partly fallen "joshua tree" about four feet from the ground. Both contained eggs.

*Psaltiriparus minimus grindae*. Grinda Bush-tit. Only one nest found; contained three slightly incubated eggs on May 9; on the sierra, back of Miraflores. While this bird has been reported as being commonly distributed, I was unfortunate enough to run across but few individuals in these southern mountains.

In conclusion, I found that for a goodly part of the mainland of Lower California (1) very little is apparently known about the actual nesting of most of the land birds; (2) and that breeding dates and localities are variable with seasonal climatic changes, depending upon the supply of fresh water, and this, in turn, regulates the food supply. For example, the case of Xantus Screech Owls just commencing to nest in the middle of May in the Cape region, I attribute solely to the matter of ample food supply. If early rains are sufficiently heavy to provide an abundance of water during the early spring, I believe these owls would be found breeding correspondingly earlier, in direct parallel with the other bird and animal life locally.

Furthermore, I think that this dry season of 1933 bore directly upon the fact that so many species of birds laid so few eggs per nest, simmering down to the all-important matter of food for sustenance per individual, plus more or less restricted breeding area and scarcity of nesting sites. This is proven at Miraflores where, while water was far from abundant, there were numbers of pools and springs. Within a radius of two miles from this water, birds were well distributed, as for instance again, the Screech Owls. But when one went ten miles from this water supply, even the Screech Owls were absent in the choicest looking cardon "stands."

In other words, the season of 1933 was a dry one, while the season to come might be a wet one; while I found screech owl eggs in the middle of May in 1933, one might be entirely too early or too late at this particular locality in another year.

(3) Acknowledging this uncertainty of dates and localities from season to season, successful collecting of eggs in this country is extremely difficult when coupled with the natural obstacles of travel and heat.

(4) Where water in any quantity exists, utilization of the soil is rapidly expanding by the natives. With the bird life naturally centering about the watered spots, it is inevitable that certain races of birds will become scarcer, or even decrease to the vanishing point as is apparently the case with the San Lucas Ani now. Every native we encountered in the rural sections was armed with a "sling shot," a weapon with which they are quite expert marksmen, using small round stones as missiles. By the word "natives," I mean youngsters of a few years up to men of fifty. On the list of persecuted birds are the smaller owls, cardinal, pyrrhuloxia, and brightly colored birds for which the youngsters, in particular, have an ever open eye. Also, I found that the Xantus Hummingbird is considered the target which elevates the "amateur" to that of "expert," and much pride is taken in "lifting" these little animated gems off branches.

*Alhambra, California, November 26, 1934.*

## FROM FIELD AND STUDY

**Feeding Habits of the Black-bellied Plover in Winter.**—When we arrived at La Jolla, California, at the end of October, 1933, there were three Black-bellied Plovers (*Squatarola squatarola*) on the strip of shore-line directly in front of what was to be our home for the winter. And as it turned out these plovers were also established for the winter. Each bird had his own particular strip of shore-line, and each had his own favored loafing ground. Each claimed and held for his very own a strip of perhaps a hundred yards. No other Black-bellied Plover was permitted to encroach, but shore birds of other species were allowed to forage freely. Up and down the beach for a distance of several miles, wherever there were patches of sandy beach between rocky headlands, there were likely to be found lone Black-bellied Plovers established for the winter. The far stretches of unbroken sandy beach were not favored by the plovers so far as we observed.

The Black-bellied Plover, once established on his winter quarters, is the least active of all the shore birds. He seems not to have the appetite of other shore birds, and hours each day he spends in silent contemplation. Occasionally when the sun shines warmly the Black-bellied lies flat on his belly and takes a sun bath. When actually sleeping he tucks his bill in the feathers of his back and stands on one leg. Often when but slightly disturbed he hops away rather than untuck his sleeping leg. It might be said that he has this habit in common with many other shore birds.

When foraging, the Black-bellied Plover runs a few mincing steps and then assumes a thoughtful attitude. He is a dainty feeder; he seldom probes for his food, but dabs lightly here and there, picking his food up from the surface of the beach. Much of his foraging he does at low tide when the kelp-covered rock flats lie exposed about his station. When feeding on the kelp-covered flats he is often associated with other shore birds. He never objects to the presence of Sanderling, Curlew, Godwit, Willet, Black Turnstone, or even the great American Egret, and he is quite friendly to the five little Least Sandpipers that come to feed on his preserves. But let one of his neighbor Black-bellied Plovers come onto his domain and he at once declares war. He ruffles his neck feathers, crouches into a belligerent attitude and trots toward his enemy as though to butt him from the premises. His bluff always seems to work, no blows ever are struck. But should he go onto his neighbor's territory the situation is reversed and he is soon persuaded to turn tail. When once established on his winter claim the Black-bellied Plover is able and eagerly willing to protect the claim against all comers of his own race.

These lone Black-bellied Plovers on their chosen territories stayed all winter, and as the weeks of March began to slip away the birds still remained. Now we began to hope that we might see them take on their black-bellied summer plumage. On March 20 we noted the first change; on one of the birds, black appeared to be spreading out across the breast from under the wings. The belly and breast of this bird were now mottled black and white.

On the shore of Mission Bay on the morning of April 2, in a flock of ten Black-bellied Plovers, there was one bird in full black-bellied plumage. On the morning of April 3 our three Black-bellied Plovers were missing from their stations. However, up until the day we left La Jolla (April 12) stray birds were occasionally noted.

When traveling the migration lanes the Black-bellied Plovers move in flocks. Early in November a flock containing four or five hundred birds was seen at Mission Bay. And again on January 23 a flock of fifty was seen. These birds probably moved farther south, as no large groups were seen during February, March, or April.—CHAS. W. MICHAEL, Yosemite, California, June 4, 1934.

**Two Records for San Diego County, California.**—*Mniotilta varia*. Black and White Warbler. This warbler apparently is sufficiently rare in San Diego County to warrant the recording of a specimen that was taken on September 14, 1933, at Bird Rock, a residential section between San Diego and La Jolla. It was given to me by a small boy who shot it with his BB gun while it was climbing, creeper fashion, up the trunk of a pepper tree in his garden. Although not received until about three days after its death, I was able to save it and add it to my collection. It was not sexed on account of mutilation by the shot, but by comparison with specimens at the museum

of the San Diego Society of Natural History it appears to be a female or immature bird.

*Larus canus brachyrhynchus*. Short-billed Gull. According to L. M. Huey of the San Diego Society of Natural History, the status of this gull in San Diego County is uncertain. On December 15, 1934, while collecting sea-birds off La Jolla, in company with T. W. Harvey, III, we noticed a gull slightly smaller than the abundant Western, California and Ring-billed gulls. When it flew within range we both fired and secured the bird which has been identified by Mr. Huey as the above species. It is a female and is now in my collection.—KARL W. KENYON, *La Jolla, California, March 2, 1935*.

**Black-headed Jay Mimicking Loon.**—At Okanagan Landing, on a morning in early May, the tremolo call of a Loon (*Gavia immer*) coming, so I thought, from far out on the lake and subdued by the distance, was accepted as genuine without question as to its source. Then my attention was attracted to a party of three Black-headed Jays (*Cyanocitta stelleri annectens*) which moved about in the brush along the lake shore, and, to my surprise, the low, quavering call, again repeated, was traced to one of these birds which was perched on a hawthorn branch thirty feet from where I stood. Upon its last performance the mimicked loon call was followed by a warbled cadence of four liquid notes.—J. A. MUNRO, *Okanagan Landing, B. C., Canada, August 11, 1934*.

**Condors in Northern Los Angeles County, California.**—On August 9, 1934, at a point near the Antelope Valley highway and some eight miles east-northeast of Sandberg, I saw seven Condors (*Gymnogyps californianus*) feeding upon, or flying about, a dead sheep. They were accompanied by two Turkey Buzzards and thirty or more Ravens.

On December 14, 1934, I saw three Condors circling high over the Liebre Ranch headquarters. On December 15 three sailed within fifty feet over Sandberg (on the Ridge Route), going toward Cobblestone Mountain; on December 17, one sailed over at a height of fifty feet, headed northeast toward the desert. On January 12, 1935, three Condors sailed over the same place, 200 feet or so aloft, also headed northeast toward the desert.—HARVEY T. ANDERSON, *Sandberg, California*.

**Unusual Food Habits of California Gulls.**—During the past three years a few local complaints and newspaper reports have been received that gulls in Salt Lake Valley, Utah, have become destructive to the cherry crop. The first report in 1931 could not be confirmed and the State game commissioner wrote that he had been unable to verify the complaints although he had heard of a number.

In 1932 additional reports were received, and during the past season damage was reported in both Utah and Salt Lake valleys. Under date of September 13, 1934, Newell B. Cook, Commissioner of Fish and Game in Utah, wrote the following:

"As the cherries ripened in different localities in the State, the Sea-gulls would work heavily on this fruit. If you were to go to Rock Island this fall, you would find the entire north end of the island covered with cherry stones. This is also true of some of the islands of Great Salt Lake. These birds were very destructive the last year to Utah's crop of cherries.

"During the hot weather of early July the Sea-gulls also worked heavily on grasshoppers and crickets. They would eat and disgorge several times a day. This also happened in 1929 at Roy, Utah."

A number of competent and reliable observers have witnessed the gulls feeding on the cherries, and in localized areas the damage has been considerable. Mr. C. Lynn Hayward, of the zoology department of Brigham Young University, Provo, Utah, writes under date of January 23, 1935, that since the gulls appeared to be unable to alight in the foliage, they would hover over the trees and beat the fruit down with their wings. The birds would then fly to the ground and feast on the harvest. A county agricultural agent reported that in many cases the ground was heavily covered with ripened fruit and that the birds had practically stripped the trees.

Mr. Hayward further reported that "the gulls now nest on Rock Island, Utah Lake, in great numbers and the colony there has been on the increase for a number of years. A number of parties who visited the island last summer report . . . that the ground in the vicinity of the nests was thickly strewn with cherry stones. Just how long the

gulls have been attacking the cherries I do not know, nor do I have any definite information as to just how widespread the damage is."

It is reported that almost countless cherry stones can be seen near the nesting sites on the various islands of Great Salt Lake where the California Gull (*Larus californicus*) nests. A report from Davis County states that in addition to knocking the cherries to the ground, the gulls flop down in the tops of cherry trees, with outspread wings supporting their weight, and devour all fruit within reach.

This new food habit seems to have been developed largely as the result of an increased gull population and consequent greater competition for the limited food supply.—CLARENCE COTTAM, *U. S. Biological Survey, Washington, D. C., February 12, 1935.*

**Another Winter Record of the Townsend Warbler in Portland, Oregon.**—On January 11, 1935, a male Townsend Warbler (*Dendroica townsendi*) was found dead in a small park near Chapman School in Portland, Oregon, by Ruth Russell Du Bois. This constitutes the fourth winter record of this species for Oregon. The first bird, found on January 13, 1928, was recorded by Gabrielson and Jewett (*Pacific Coast Avifauna* no. 19, 1929, p. 40) and the second and third, January 12, 1931, and January 13, 1932, were reported by Jewett (*Condor*, 34, 1932, p. 190).

It is worthy of note that the birds were found on almost identical dates of the various years, that is, January 13, January 12, January 13, and January 11. A further item of interest is that the first, third, and fourth birds were found by Mrs. Du Bois under the same small grove of fir trees.—H. M. DU BOIS, *Portland, Oregon, January 24, 1935.*

**Random Notes on Raptors at Florence Lake, California.**—My limited acquaintance with the raptors may prove of interest to those who may be compiling economic data for or against these birds. Personally there is one of this family that visits Florence Lake, Fresno County, California, that I come as nearly hating as it is possible for me to despise any of Nature's children. That is the Sharp-shinned Hawk (*Accipiter velox*). And I am grateful for the fact that they come to plague me for a few days only, in September.

Sometimes a single one will turn our usually peaceful bird haven into utter chaos. More often, there are several of them together, as many as six sharp-shins having been here at the same time. While they remain it matters not what luckless bird shows itself on the feeding ground, the sharp-shin drops on it, grasps it out of mid-flight or eventually gets it when it seeks safety in a tree. From dawn until dark these bloodthirsty fellows snatch our pets. A few have paid the penalty, but more often they escape Mr. Lofberg's aim.

Chickadees, juncos, Brewer Blackbirds, Robins and Blue-fronted Jays are the birds that are here at the time, to be preyed upon. Whether the Clark Nutcrackers are wiser or their size intimidates this hawk, I do not know. Whatever the reason, the nutcrackers go about unmolested.

For several years we had chickens. In December or January of those years, a Western Goshawk (*Accipiter atricapillus striatulus*) would try to catch a chicken—and occasionally succeed. The hens would give their danger call and I would grab Mr. Lofberg's revolver and hurry out. I would merely shoot a hole in the air, the report frightening me quite as much as it did the goshawk, yet the bird would hasten away. Every eleven days, during the time the goshawk was in the vicinity, this comedy would be re-enacted. Over a period of six years we know the goshawk killed four of our chickens. Two of these I was able to retrieve for our own use, as I arrived at the kill. But the other two were partially eaten when I arrived on the scene. Even so, I hold no particular grudge against these birds. With the goshawk, creatures do have an even chance; but with the sharp-shin, they are doomed the moment the sharp-shin sees them. Or so it seems to me.

Apparently the goshawk did not prey on our birds. Jays and nutcrackers set up a clamor when this hawk was near and they would flock above it. The other birds sought cover. But I never saw it bothering any of them, and since we disposed of the chickens the goshawk no longer comes at all.

Two pairs of Golden Eagles (*Aquila chrysaëtos*) spend a long summer season near Florence Lake. One pair apparently has a nest on the dikes two miles north of us, though I have been unable to locate their aerie. They hunt over Lower Jackass

Meadow. The other pair has a nest on Florence Rock, a sizable butte at the upper end of the lake and about two miles south of our house. For years I have made many trips each spring to watch them. Their nest is on a ledge, with an overhanging rock roof, and is quite inaccessible. Before the lake begins to fill there is a point in the lake bed where I can get a good view of this nest, with the binoculars. Eventually this high point becomes submerged and many times I have reluctantly brought my last call to a close because the water drove me from the topmost rock. This usually happens at the time that the eagles are bringing food to their young and there my observation must stop because the nest cannot be seen from any other dry spot. The only food I have been able to identify has been snakes and ground squirrels.

The most interesting thing that has occurred while I watched has been their aerial circus. Whether this occurs more than once a year I cannot say, but I have never seen it more than on one day during the season. A distant call first attracts my attention. This comes from a mere dot in the sky. The second bird then leaves its perch on the nesting ledge and soars in wide circles, upward. Before it can attain the height of its mate, the "dot" comes hurtling down with closed wings, at a terrific speed. When not over a hundred feet from the ground and just as I am sure it will be dashed to pieces, out come the wings and this bird instantly goes into a series of daredevil stunts. It rolls, stands on its head or tail, or slides earthward sidewise, with extended wings. Between these it may perform flights that remind me of a skater cutting figures on the ice. When it has exhausted its repertoire it ends on a line with the nest. But instead of flying straight to it, the eagle makes three perfect loops in the air, coming out of the last within a couple of flaps (of the wings) of the ledge.

Meanwhile the one in the air has been forgotten entirely but soon the faint call reminds me to look upward to find that it, too, has become a dot. Upward starts the resting eagle. Down comes the distant one to go through the same routine. Always these flights end with those three loops that bring them onto the nesting ledge. For an hour or more they continue this exciting sport. Then the one on the ledge fails to heed the call and remains until the other has alighted beside it. Then off they fly together toward Blaney Meadow, about five miles to the southeast of their home. This seems to be their particular feeding ground.

This spring, being a shut-in, I have not been able to do any hiking, whatsoever. I bemoaned the fact that I would not get to see any of my eagles, as I had never seen either pair near our home. Whether by accident or design, twice my Florence Rock pair has come to call on me. As they soared over the house they gave their calls which advised me of their nearness and I got to see them.

The Sparrow Hawk (*Falco sparverius*) I have seen more frequently and constantly than any other raptor. Early in March a pair arrives to spend a few weeks near the house. Very likely they do this because we are situated in a sunny, open space, and insects and rodents come out here earlier than at their real summer abiding places. Many times we have severe weather after they arrive and at such times they invariably prey upon a few birds at the station. Blue-fronted Jays and Red-winged Blackbirds (males only here at the time) are the species they have caught in our yard. If they have caught any of the other species we have not seen them.

Since Sparrow Hawks prey upon our guests only at a time when they must be desperately hungry, we have not resented their doing so. Later, when insects and rodents become plentiful, I have never seen the Sparrow Hawk molest a single bird. In fact many times I have seen a Meadowlark (adult or young), Yellow Warbler, White-crowned Sparrow, Mountain Bluebird, or other meadow dwelling bird, perched in the same tree with one of these hawks, with neither one nor the other showing concern or fear.

About ten o'clock one February night we could not imagine just why our only neighbor, a bachelor, should be sharpening a saw. We were more curious when he seemed to be making a regular practice of so doing. Before we thought to ask him about it, we discovered a small owl on our back steps. We did not know grown owls could be so small as that one and thought it must be a youngster. However, the bird key showed *Lechusa* (Spanish for owl) to be a Saw-whet (*Cryptoglaux acadica*) and then the cause of the saw sharpening became clear to us.

In the years that followed (1929-33) we could judge our coldest spell of the winter by *Lechusa*'s arrival. This coldest period may be at any time from late December until late February. But whenever we found *Lechusa* perched at our back door, after dark, we knew the fires would require extra stoking. White-footed mice attracted the



owl to that particular perch. On the coldest mornings she would continue to rest there on the walk, with her back as close to the porch door as possible. We thought it must be for the heat that came from the house, and thereafter placed an oil stove just inside that canvassed door. Ofttimes *Lechusa* remained until noon, and if we needed anything out that way we simply waded snow clear around the house, rather than disturb our cunning guest.

So long as we made no attempt to touch her she allowed us to come very close. She would look up through her eyebrows like a bashful child. One evening she was in a shed and I captured her, expecting my hands to be torn to shreds. But *Lechusa* made not a single effort to mutilate me. I presented her with band number A238126 and continued to play with her for an hour or so. She seemed to be thoroughly enamored when I stroked her head.

Our police force (Blue-fronted Jays and Nutcrackers) always scolded when she was about, but only once did we see her bother any of the birds. Then it was one of the jays that she caught about two o'clock in the afternoon of a bright, clear day. We could scarcely believe our eyes. As she carried that jay to a tree it looked twice as large as its bearer.

This past winter (1933-34) we had no sub-zero weather. Nor did *Lechusa* come near us. We hope the weather was the reason for such neglect rather than that she is no more.

There are other hawks and owls that spend more or less time in the vicinity of Florence Lake, but so far they have evaded identification. The hawks have been too high for binoculars to reveal characteristics, or the bones too lazy to crawl out of bed to go looking for the owner of the hootings, which we know to be those of owls; but which ones we have not yet the slightest idea.—LILA M. LOFBERG, *Florence Lake, Big Creek, California, May 5, 1934.*

**Vermilion Flycatcher Increasing in Coachella Valley, California.**—Since I first found the Vermilion Flycatcher (*Pyrocephalus rubinus mexicanus*) breeding in Coachella, California, in 1928 (*Condor*, 31, 1929, p. 75), it has been my good fortune to visit the vicinity frequently. It will be gratifying to all bird lovers to learn that these gorgeous beauties have now increased until they are not uncommon. I have seen over a dozen within a few hours on several occasions. A number of nests with eggs, as well as old nests, have been observed, and on March 25, 1934, I saw several young birds which could fly, although still being fed by the old birds. A female was on a nest containing two fresh eggs on March 3, 1935, while the male bird was perched about fifty feet away.

All of the ranchers with whom I have talked have noticed the birds, although some of them do not know them by name, and seem to be as anxious as I am to have them increase.—WILSON C. HANNA, *Colton, California, March 11, 1935.*

**Lewis Woodpecker in Death Valley.**—About sunrise on October 25, 1934, several Lewis Woodpeckers (*Asyndesmus lewisi*) were observed on the golf course on Furnace Creek Ranch, Death Valley, California. These birds, five or six in number, were perching on fence posts along the edge of the grassy area and were not very active at such an early hour. They allowed me to approach quite near before flying to other posts. I can find no published posts. I can find no published record of the Lewis Woodpecker in Death Valley and believe that this adds one more species to the list of that region.—JOHN MCB. ROBERTSON, *Buena Park, California, January 25, 1935.*

**Is the Northwestern Robin Migratory?**—The breeding range of the Northwestern Robin (*Turdus migratorius caurinus*) is given in the fourth edition of the A. O. U. Check-list (1931, p. 256) as "from Glacier Bay, Alaska, south through the Pacific coast region of British Columbia and Washington." Nothing is said as to whether this race is resident within its breeding range or whether its population in whole or in any part migrates for the winter season more or less distance to the southward. Brooks and Swarth, however, say (*Pac. Coast Avif.* No. 17, 1925, p. 123) on this score: "Probably permanent resident over much of its habitat; certainly so in the southern part of Vancouver Island . . . and on the southern mainland coast [of British Columbia]."

Referring now to California, Dawson (*Birds Calif.*, 1923, p. 760) ascribed *caurinus*

to this state on "largely presumptive" basis. He thought that "many winter birds and early spring migrants are much darker-breasted than are the breeding birds of our own mountains," and he cited in particular one specimen (no. 19709, Mus. Vert. Zool.) as being "as dark as any specimen from Vancouver Island"—hence, by implication, to be referred to *caurinus*. A recent, much more authoritative record is contained in Hellmayr's "Part VII" of his "Catalogue of Birds of the Americas" (Field Mus. Nat. Hist., Publ. 330, Zool. Ser., 13, 1934, p. 353). Definitely specified, out of four specimens of *caurinus* listed as in the Field Museum, are three from "California (Nicasio, 1; Seavine Flats, 2)." By inference from these records, by Dawson and by Hellmayr, one must conclude that the Northwestern Robin is at least partially migratory, individuals reaching even to southern California. Since this conclusion would mean adding a subspecies to our "State List," I deemed it desirable to verify the identifications.

By courtesy of Director S. C. Simms, of the Field Museum, the three specimens of that source are now before me. The data borne by their labels are as follows: Field Mus., no. 70130, Nicasio [Marin Co.], Calif., Feb. 16, 1911; collected by C. A. Allen; ♂ [as marked on original label, though "♀" on museum label]. Field Mus., nos. 70128-29, ♂ and ♀; San Seavine Flats [head of San Seavine Canyon, 5 miles or so NNE of Etiwanda], San Bernardino Co., Calif.; Dec. 27, 1915; collected by Halsted G. White. No. 70130 is an adult male, showing but little wear and probably only slightly faded; it has the depth of color below, and minimum of white scalloping, usual for male robins over one year old; wing 131.5 mm. No. 70128 is a first-winter male, in fresh, very slightly abraded plumage; white scalloping beneath, conspicuous; wing 133 mm. No. 70129, marked female, is, I judge, in first-winter plumage, little abraded or faded; wing 137.5 mm.

The Dawson-recorded bird above referred to (no. 19709, Mus. Vert. Zool.) was taken by me March 9, 1911, at Tracy, San Joaquin Co., Calif. It is in "high" male plumage—black head, deep red breast, etc.; just the amount of wear had taken place to "reveal" the ground-colors in clearest tone, with the result that it is, in truth, about the richest colored bird in our entire California-taken series. Its wing measures 143.0 mm.

Now to the point: None of these four birds recorded from California as "*caurinus*" are, in my judgment, really of that race; all are *Turdus migratorius propinquus* that is, of this race as represented by robins which breed within the boundaries of California. My reasons for this determination are as follows:

*Caurinus*, like many other passeriform races of the northwest coast region, is small. Using wing-length roughly as an index to general size, I find that eleven males at hand from Vancouver Island show this measurement to average 130.8 mm.; extremes, 125.9 and 134.8. The Californian examples are larger. Then the dorsal darkness of true *caurinus* is marked as compared with all Californian birds; furthermore, even in worn summer plumage, this dorsal color is of a deep olive-gray tone rather than deep mouse gray. In the winter plumage of *caurinus* (for example, adult male from Vancouver, B. C., January 28, 1929, collected by R. A. Cumming) the deep olive tone of the mantle (inclusive of "edgings" of wings) is notably different from the hair brown tone of the California-taken "*caurinus*" now under scrutiny.

I am now sorry that I did not ask also to see the Washington example Hellmayr listed under "*caurinus*." Perhaps that one, too, was really *propinquus*—in which case I suspect Hellmayr's mistake was due to his lack of opportunity to compare with true *caurinus*. At any rate, it now appears that, as far as shown by material examined by me, the race *caurinus*, if migratory to the southward at all, does not reach as far as California. As to the status of robins in Washington and Oregon, I have insufficient information for warranting any general statement. Here is something for north-western bird-students to look into: the winter-summer status of robin populations there, and the respective subspecific identification of these.—J. GRINNELL, *Museum of Vertebrate Zoology, Berkeley, California, February 17, 1935.*

**Snow Buntings Perching on Trees.**—During last January, in common with most of North America, we in Saskatchewan experienced some very severe weather. This severe weather caused many of our winter birds to seek shelter around the ranch buildings. While feeding my cattle in a yard sheltered by willow bushes I was interested one day in watching a flock of about forty Snow Buntings (*Plectrophenax nivalis*) which were attracted by the seeds in the hay. Now and then buntings would circle

overhead and settle in a cluster on the willows. This was the first time in my experience of some thirty Canadian winters that I have seen Snow Buntings perch on a tree or bush, though they will frequently settle on buildings, haystacks or wire fences.

Shortly after, I received a letter from a friend living thirty miles distant, who is a close observer of birds and has lived all his life in Saskatchewan. He remarked on this same phenomenon on his farm at the same time, and asked me if I had ever noted it before.

T. S. Roberts in "Birds of Minnesota" says "the Snow Bunting is a ground-loving bird, seldom alighting in trees." On the other hand, in "Manual of British Birds," by Saunders and Clarke, we read that "the Snow-Bunting has frequently been observed to perch on trees." Cameron, in his most interesting notes on Montana birds (Auk, 24, 1907, p. 405), says: "Snowflakes perch on corrals here, but I have never observed them to perch in trees, although this is a well known habit referred to by many ornithologists in different parts of the world."

This peculiar aversity for trees seems to be shared by birds of various kinds, but in varying degree. It naturally affects chiefly the ground-frequenting and ground-nesting species, and those that prefer the open spaces away from bushes or trees of any kind. As a group, the longspurs would not be expected to perch on trees, and I have never seen a longspur in such a situation. But Roberts writes of the Lapland Longspur alighting on small oaks. I once saw a flock of Rosy Finches (*Leucosticte*) settle in a clump of bushes, and Cameron (as above) mentions their doing so. In "Birds of California" Dawson says: "I never save once saw the *Leucostictes* alight in a tree, and I have an idea they feel very ill at ease in such a situation."

Of all North American land-birds, perhaps, the Horned Lark (*Otocoris*) has the least use for a tree or bush. This trait probably is common to larks of all species, with the exception of the Wood Lark of Europe; and to all the pipit family, excepting the Tree Pipit.

Turning to a different Order, the pigeons, which may be considered truly arboreal, an outstanding exception is the Rock Pigeon; of this bird Howard Saunders says: "it has a marked objection to alighting on trees—a peculiarity which is to a great extent shared by its domesticated relatives." Among the owls, the Snowy and the Short-eared seldom appear to favor anything taller than a fence post, though either may be seen on top of a haystack; a Burrowing Owl in a tree could scarcely be imagined. Of the diurnal birds-of-prey the Marsh Hawk alone prefers the ground to rest upon at all times. Apparently it has not the habit of surveying the landscape from an elevation which is so noticeable a custom with so many of the raptors.—LAURENCE B. POTTER, Gower Ranch, Eastend, Saskatchewan, Canada, March 9, 1935.

**A Second Occurrence of the White-fronted Goose in Arizona.**—Swarth says of this species (Pacific Coast Avif. No. 10, 1914, p. 14): "Status—Coues (1866a, p. 98) found it abundant on the Colorado River. There is no published statement of its occurrence in the region since that time."

On the night of October 3, 1934, the authors were encamped on the shore of Parks Lake, a little-known body of water in southeastern Graham County, twenty miles north of San Simon and thirteen miles west of the New Mexico-Arizona boundary line. The lake lies in the San Simon Valley at an altitude of 3400 feet, and was on that date perhaps one and a quarter miles in length by one mile in width, and a good resting place for waterfowl on account of its shallow margins and vegetated bordering flats.

Just before sunrise on October 4 a flock of about thirty geese was noticed coming in from the west. They alighted down the lake opposite camp and swam about in the rays of the rising sun. Though they appeared to show too much white, it was supposed they were Canada Geese, but the distance was too great for certain identification. They finally came to rest on the opposite shore, where they remained while we began a leisurely circuit of the lake, intent on the interesting birds near at hand.

What was our surprise when we drew nearer, to discover they were certainly not Canada Geese! Then began a stalk in earnest and we were fortunate enough to come within about fifty yards before they took flight. Thus, both being provided with binoculars, we were able to make positive identification of them as White-fronted Geese, *Anser albifrons*. Failing to collect a specimen, the subspecies is a matter of uncertainty.—CHARLES T. VORHIES and WALTER P. TAYLOR, University of Arizona, Tucson, Arizona, December 15, 1934.

**Noon-day Feeding of the Pacific Nighthawk.**—At midday, June 2, 1934, I was hunting along Indian Creek, some two miles southeast of Riddle, Owyhee County, Idaho. The sky was clear. The full rays of the summer sun had caused a subsidence in the activities of the birds, save for two Pacific Nighthawks (*Chordeiles minor hesperis*). They were actively zig-zagging over the creek, evidently in pursuit of insects. To me they seemed out of place. One male, now number 619 in my private collection, came within range of my gun and I collected it. I was curious to see what the bird had been feeding on at that time of day; so the stomach, well gorged with insects, was preserved.

Upon my return here, Dr. Edwin C. Van Dyke, Professor of Entomology at the University of California, kindly identified the insects with the following results:

Predaceous water beetles: *Colymbites* sp., numerous; *Agabus* sp. one or two.

Water scavenger beetles: many *Tropisternus lateralis*; many *Enochrus* sp. and other small species; many *Sphaeridum scarabaeoides*, a manure feeding species.

Burying beetles: *Silpha bituberosa*, a single specimen.

Dung beetles: one *Aphodius fimetarius* and two *Aphodius vittatus*.

Rove beetles: one *Creophilus maxillosus villosus*.

Grasshoppers: one hind leg of *Melanoplus* sp.

To sum up, the food of this nighthawk, at the time it was shot, consisted of aquatic and scavenger beetles and one grasshopper.—WILLIAM B. DAVIS, *Museum of Vertebrate Zoology, Berkeley, California, February 8, 1935.*

**The Mexican Turkey Vulture in the United States.**—During the summer of 1933 Mr. Frank M. Setzler, Assistant Curator of Archeology in the U. S. National Museum, obtained a small collection of bird bones in excavations on the old Moorehead Ranch, twenty-two miles west of Comstock, Texas, in what is known as Bell Cave, located on the east canyon wall of the Pecos River one and one-half miles above its mouth. The age of the deposit has not been certainly determined except that it is prehistoric, possibly one thousand years or more old.

The broken pelvis of a Turkey Vulture found in this collection is of particular interest as it is that of the Mexican form, *Cathartes aura aura*, which has not been known within the United States except from Pleistocene deposits in Florida. *C. a. aura* in its skeleton, when compared with the two northern subspecies *C. a. septentrionalis* and *C. a. teter*, is marked by diminutive size. The total length of the Bell Cave pelvis measured between proximal and distal surfaces of centra is 70.3 mm. It includes 13 ankylosed vertebrae. A specimen of *C. a. aura* from Matamoras measures 73.2 mm. and includes 14 vertebrae. Five *C. a. septentrionalis* from Maryland and Virginia range from 84.0 (14 vertebrae) to 91.5 mm. (15 vertebrae). Dr. Alden H. Miller has kindly given me measurements from nine specimens of *C. a. teter* from California and Nevada that range from 79.0 (14 vertebrae) to 86.6 mm. (15 vertebrae). While *teter* averages slightly smaller than *septentrionalis* it is decidedly larger than the specimen of *aura* from Matamoras.

Variation in the number of vertebrae in the sacral region is interesting. The fact that the Bell Cave pelvis includes only 13 vertebrae might at first thought seem to explain its small size, but comparison of specimens shows that this is not true. While total length of the pelvis is naturally affected by the number of ankylosed vertebrae, the Texas specimen is so far below the range of size for *C. a. teter* that another vertebra added to it would still throw it with the smallest of the three subspecies. Further, it is decidedly smaller in all its dimensions when compared with northern specimens.

Associated with the pelvis from Bell Cave is a fragment of an ulna of *Cathartes* that is too broken to be of particular significance. There are also some bones of the Ferruginous Rough-leg (*Buteo regalis*), another species of hawk of the genus *Buteo* that cannot be identified, and some bones of the Mallard (*Anas platyrhynchos*), all apparently of equivalent prehistoric age. The sternum of a Lesser Scaup Duck (*Nyroca affinis*) from its appearance is probably less ancient.

The presence of remains of the Mexican Turkey Vulture in these cave deposits indicates the desirability of collecting a series of these vultures along the Rio Grande. No skins are available from this area so far as I am aware, and it is possible that the Mexican race may range regularly within the United States, especially along the lower course of the river.—ALEXANDER WETMORE, *U. S. National Museum, Washington, D. C., January 29, 1935.*

**Wintering Hummers Again.**—More and more definitely the Costa Hummer (*Colaptes costae*) is attaining the status of "resident" on our southern California desert areas, and the change of status is in all probability not of the birds' making so much as of our own manner of thinking.

Since Grinnell's first report in 1904 of Costas at Palm Springs, the records have been accumulating. To these data I would add the following notes. Three days, from November 30 to December 1, of 1934, were spent in Deep Canyon of the Santa Rosa Mountains, one mile off the road from Palm Springs to Indio. Birds were very scarce and only ten species were noted. Of these, Plumbeous Gnatcatchers were most abundant, Phainopeplas and Costa Hummers about tied for second place, Verdins were next, and Linnets rare. Costa Hummers thus occupied a prominent place in the avian picture. In walking one hundred and fifty yards up the wash, four of these birds were noted. Three females and one juvenile male were collected.

Adult males were noted and the nuptial flight performance was three times noted by myself, and once by a colleague. Blossoming shrubs of the chupa rosa (*Beloperone californica*) were fairly abundant, but the hummers were not restricted to their immediate vicinity. More female hummers were seen than males.

While the status of the species as a resident on the desert is becoming more apparent, winter records for the Pacific slope of southern California are appearing. Woods (Condor, 36, 1934, p. 116) noted a male Costa at Azusa, California, January 9, 1934. On January 5 of the present year a female was observed at Point Mugu, Ventura County, and was collected by Alden H. Miller (now no. 66856, Mus. Vert. Zool.).—LOYE MILLER, University of California at Los Angeles, January 16, 1935.

**Winter Occurrence of the Western Bluebird and the Mountain Bluebird in Montana.**—On the afternoon of January 16, 1935, during a five-minute bus stop, I observed a female Western Bluebird (*Sialia mexicana occidentalis*) in the town of Polson, Montana, at the south end of Flathead Lake. While I watched it, the bird flew to the front of the Salish House and commenced feeding on the small berries borne on a large climbing vine that reached the roof of the hotel. The departure of the bus at this point prevented me from identifying more exactly the bird's food and from determining whether or not more birds of the same species were present in that vicinity. This appears to be the first record of the winter occurrence of the Western Bluebird in Montana.

In the Condor for May, 1929, I recorded the first known occurrence of the Mountain Bluebird (*Sialia currucoides*) in this state during winter: a pair of these birds resided in Missoula during the winter of 1928-29. In December of 1933 a Missoula newspaper reported the occurrence of a bluebird in that city, but I was unable to obtain verification of the record. During the same month (December 3), however, I observed four Mountain Bluebirds at my home near Fortine, Montana. These birds were not seen at any other time during the winter.—WINTON WEYDEMAYER, Fortine, Montana, January 23, 1935.

**An Additional Record of the Whistling Swan in Arizona.**—In a recent issue of the Condor (36, 1934, p. 115) Vorhies gives a review of published records of the Whistling Swan (*Cygnus columbianus*) in Arizona. He also records the capture of a young Whistling Swan in March of 1919 and the shooting of another in December.

I have never seen the swan in Arizona but have information from several sources. It may be well to recall that Mearns (Ornithological Vocabulary of the Moki Indians, American Anthropologist, 9, 1896, pp. 391-403) lists the Whistling Swan as being known to the Hopi Indians. In view of later records for the plateau it is conceivable that this bird at times has loitered on some of the desert lakes. My Hopi informant, however, is not familiar with the swan nor has he ever heard of this bird from other Hopis. The swan has been seen on Roosevelt Lake in Gila County, however; for in 1920 I was informed by Mr. James J. Lane, and also by a Mr. Jackson, both parties then residing at the lake, that about ten years before there was a flock of twelve swans seen on the lake during the winter. More specific data were not available.

More recently swans have been noted on the plateau near Flagstaff. In the Dean Eldredge Museum, about five miles east of Flagstaff, there is a spread-wing mount of a swan. This bird was shot on Mormon Lake, about thirty-five miles south of Flagstaff, in the fall of 1925. At my request Dr. A. Wetmore examined this mount.



While identification as to species was somewhat difficult because of the condition of the specimen and its position high in the gabled roof of the building, Dr. Wetmore considered it a Whistling Swan (*Cygnus columbianus*).

Mr. J. D. Walkup reported to me that on May 13, 1934, he saw a flock of seven swans on Babbitt Tank, about thirty miles east of Flagstaff, on U. S. Highway 66. These birds were observed from a car and were seen to approach and settle on the pond. The swans were not present the next day.—LYNDON L. HARGRAVE, *Museum of Northern Arizona, Flagstaff, February 4, 1935.*

**Cowbirds Appear in Yosemite.**—On the morning of May 16, 1934, I discovered a rather unusual nest of the Cassin Vireo (*Vireo solitarius cassinii*). So much tissue paper was incorporated in the construction of this nest that I wanted to photograph it when the parent birds began to feed their young, but on the morning of May 21 when I again visited the nest it was apparently deserted. Two days later I collected the nest and turned it in to the Yosemite Museum. When I first looked into this nest there were three typical Cassin Vireo eggs, but when I collected the nest there were only two eggs, one vireo egg and one slightly larger egg—a gray-green egg heavily speckled with brown from one end to the other.

Then on the morning of June 23, while out on a bird walk with Mr. H. G. Hill, a pair of Cowbirds was seen. Cowbirds having not been previously recorded from Yosemite Valley I would have hesitated to report them had it not been for the identification by Mr. Hill, who is familiar with these birds.

Since the above date, Cowbirds have been seen on several occasions and I began to wonder about the odd egg that was found in the vireo's nest. As a result, the nest and eggs were sent to Dr. J. Grinnell at the Museum of Vertebrate Zoology at Berkeley where the odd egg was identified as that of the Cowbird (*Molothrus ater*).—CHAS. W. MICHAEL, *Yosemite, California, August 20, 1934.*

**Recent Records from British Columbia.**—*Aechmophorus occidentalis*. Western Grebe. On July 17, 1933, while I was paddling through a dense growth of sago pondweed which filled one of the shallow bays of Swan Lake, a Western Grebe swam slowly toward open water uttering a low plaintive call, quite different from the familiar whistled notes of this species. Shortly afterward a single downy young, approximately one week old, was captured among the potamogeton fronds which matted the surface of the bay. Five other adults swam about in the open water close to the bay mentioned above, where at least one pair of these had nested. Swan Lake is a shallow, marsh-encircled lake in the Okanagan Valley close to the city of Vernon. Western Grebes winter abundantly on the coast of British Columbia, and they pass through the southern part of this Province in large numbers on migration to and from their nesting grounds in Alberta and Saskatchewan. The species has been noted in summer on Okanagan Lake and on Swan Lake in years previous to 1933, but hitherto has not been recorded as breeding in British Columbia.

*Glaucionetta clangula americana*. American Golden-eye. At least two pairs of American Golden-eye nested at Swan Lake, Okanagan Valley, in the summer of 1930. A female with breeding patch was taken there by Mr. Walter Weber; and subsequently on June 11 at the same place a female with brood of seven was under observation by Major Allan Brooks and myself for some time. Specimens of these downy young were collected. There are two other records for the southern interior of British Columbia based on the presence of mated birds during the nesting season.

*Limosa lapponica baueri*. Pacific Godwit. On October 30, 1931, a Pacific Godwit was shot at Colebrook, in the Fraser Valley, some twenty-five miles south of Vancouver. The specimen, which was preserved through the interest of Mr. H. C. Pyke, Cloverdale, British Columbia, is a bird of the year and is not sexed. This would appear to be the first record of the species for North America south of Alaska.

*Zonotrichia albicollis*. White-throated Sparrow. A male of the year was collected at Okanagan Landing on September 9, 1931. This is the sixth published record for the Province.

*Spizella breweri taverneri*. Timberline Sparrow. Two specimens of this sparrow, both females, were collected at White Lake in the Okanagan Valley on May 30, 1926, and May 27, 1931. Both specimens were taken in patches of deciduous growth, in



one case poplar, in the other *Philadelphus*, at the foot of an open sage-covered hillside at approximately 2000 feet altitude. It is of interest also to record the capture, by Mr. John B. Hurley, of three males in the state of Washington, some two hundred miles south of the locality noted above. The particulars are: Kittitas County, April 10, 1932 (2), Yakima County, April 17, 1932. Dr. Joseph Grinnell has kindly checked the identification of these specimens.—J. A. MUNRO, *Okanagan Landing, B. C., August 22, 1934.*

**Surf Scoters on Salton Sea.**—Reports of the presence of Surf Scoters (*Melanitta perspicillata*) on Salton Sea were verified on December 25, 1934, when the writers found the carcass of an adult male bird floating in the water off the north shore of Salton Sea below Mecca, Riverside County, California. Mr. Tom Smith, owner of the Pintail Duck Club, who made the original report, shot down three birds from a flock of eight or ten Surf Scoters that were in flight over his ponds on October 27, 1934. This is about two miles from the place where the above-named specimen was found. As the plumage and bones were in a good state of preservation this specimen was turned over to Mr. George Willett who has now added it to the collection of the Los Angeles Museum.—BEN CLARY and MARJORIE CLARY, *Coachella, California, March 19, 1935.*

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## NOTES AND NEWS

The present issue of the Condor bulks large by reason of a very special circumstance. The valuable article on Mockingbirds as studied by the Micheners, which is the leading one in this issue, was too long and hence too expensive for the Editors to accept save under outside subsidy. Appeal was made to certain Cooper Club members known to be sympathetic toward studies of this nature with the outcome that nine individuals contributed the required \$200. This means that regular Condor subscribers for the current year will be receiving an annual volume of considerably more pages than would otherwise have been possible. The names of the donors are withheld, by special request on the part of some of them.—J.G.

It has often been suggested to the Editors of the Condor that more space be devoted to "Notes and News"—that these are sure to furnish more of general interest to the reader, line for line, than anything else in an issue. Granted, perhaps; but someone has to seek out worthy items of the sort and write them up; not only space but someone's time is required in order to supply them. Our enthusiasm, after proof-reading the galley for the entire issue otherwise, is confessedly at

low ebb, and just enough copy is usually ground out to fill the space that shows up when the issue has been put into pages. This explanation is weak, we know; but a mitigating circumstance we can urge is that really the Division and Chapter minutes, which occupy several pages in each number, include very much of current personal, institutional and ornithological news.—J. G.

A truly beautiful as well as useful book is P. A. Taverner's new "Birds of Canada" (National Museum of Canada, Ottawa, 1934 [our copy received March 25, 1935], 445 pp., 87 colored pls., 488 text figs.; price \$2.00). While in a general way a combination of the author's previously published two volumes, "Birds of Eastern Canada" and "Birds of Western Canada," the text has been entirely rearranged and there is much new information. The abundant colored illustrations are chiefly from the brush of Allan Brooks, while most of the line drawings are the work of the author. The subjects of these latter are well chosen to show important structural or field characters of species; indeed, some points are thereby brought out that we do not recall having seen portrayed or even mentioned in any other work. Cooper Club members

living in the northwestern United States will find this book, we think, quite the best single volume to own as a guide to their local bird-life. General topics and questions of the day are dealt with in



Fig. 34. P. A. Taverner, author of the "Birds of Canada," Ornithologist in the National Museum of Canada, and for twenty-six years Member of the Cooper Ornithological Club.

Taverner's well-known common-sense way; and they apply south of "the line," as well as north. The book was written with the aim of stimulating "an interest, both esthetic and practical, in the study of Canadian birds." It must surely fulfill this aim.—J.G.

To our notion, the best handling of the subject of birds' voices yet to appear is Aretas A. Saunders' "A Guide to Bird Songs" (Appleton-Century Co., New York, 1935 [our copy received March 4], pp. xvii + 285, 163 figs.; price \$2.50). The method of record used takes into account time, pitch, loudness, quality and phonetics. By combinations of these features, form, rhythm, accent, and other attributes can be expressed. The graphic method of representation consists of a series of lines,

chiefly horizontal, each standing for one note of the song. The length of each of these lines indicates the relative time occupied in the utterance of the note. Its position vertically indicates relative pitch; its heaviness indicates loudness or intensity. Then the phonetic representations and other devices supplement the system, until even complicated songs like those of the song sparrow are quite satisfactorily rendered. We are reminded of the beginnings in this direction made by the late Richard Hunt, whose studies were based upon Californian birds ("The Phonetics of Bird-sound," *Condor*, 25, 1923, pp. 202-208). While Saunders' new book deals with northeastern species (nearly 150 of them), a goodly number of these are transcontinental in range, so that the book can be used with direct profit by westerners. The methods described might well be adopted by field students generally. Someone in California, with "good ear," should make it his steadfast aim for fifteen years or so, as Saunders has done on the Atlantic side, to collect records of birds' voices and then to present the results in the admirable form illustrated in the book now under notice.—J.G.

#### MINUTES OF COOPER CLUB MEETINGS

##### SOUTHERN DIVISION

**JANUARY.**—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held at 8 p. m. Tuesday, January 29, 1935, at the Los Angeles Museum, Exposition Park, Los Angeles, with President Abbott in the Chair and forty members and guests present. Minutes of the Southern Division for December were read and approved. Minutes of the Northern Division were read.

Applications for membership were presented as follows: Mr. Kenneth E. Stager, 4300 Budlong Ave., Los Angeles, proposed by George Willett; Mr. B. A. Moeller, 2525 East 37th St., Los Angeles, by Charles A. Warmer; Mr. L. F. Keller, National Park Service, Springdale, Utah, by John McB. Robertson; Mr. James A. Macnab, Linfield College, McMinnville, Oregon, by Stanley G. Jewett; and Mr. Ralph E. Dixon, Star Route, Escondido, California, by Joseph Grinnell.

Commenting on the copy of the minutes of the Affiliation Committee, submitted by secretary Luck of the Pacific Division of the American Association for the Ad-

vancement of Science, president Abbott called particular attention to minute no. 6 pertaining to the organization of the programs of participating societies. On his suggestion, it was moved by Dr. Miller, seconded by Dr. Glassell, and duly carried, that the Southern Division endorse its satisfaction of the program plan for participating societies, and recommend that the California Academy of Sciences and the Southern California Academy of Sciences be included in the same segregation as the Cooper Ornithological Club.

Mr. Willett, as chairman of the nominating committee, presented the following for officers of the Southern Division during 1935: President, Dr. Raymond B. Cowles; vice-president, Mr. Luther Little; secretary, Mrs. J. Eugene Law. No other nominations being offered, Dr. Miller moved that the names suggested by the nominating committee be accepted and the nominations closed. The motion was seconded by Dr. Rich and duly carried. Mr. Pemberton proposed that the Southern Division go on record as having very greatly enjoyed the presidency of Mr. Abbott, and extend to him a vote of thanks for the effort he made in coming up from San Diego to preside at the monthly meetings. This proposal was seconded by Mr. Willett and heartily accepted by all members present.

Mr. Laidlaw Williams, of Pacific Grove, was introduced and spoke briefly of his recent visit to La Jolla where he has been studying the courting activities of the Brandt Cormorant. Dr. Miller told of finding two individuals of the Ancient Murrelet within a week, one at Point Mugu and the other at Hyperion. Mr. John McB. Robertson reported the Chinese Spotted Dove as having arrived in western Orange County. Two of the birds were noted in early January—the first for that vicinity. Tree Swallows, at Lake Hodges, flying in and out of Cliff Swallow nests were recently seen by Miss Faddis.

Mr. Frank Richardson displayed a set of 32 colored prints of Abyssinian birds and mammals, drawn by Louis Agassiz Fierste. Mr. Abbott said he had seen the originals of these prints when in Chicago last fall and they were considered to be the best of Fierste's work. The set can be purchased for \$1.50 from the director of the Field Museum of Natural History, of Chicago, Illinois.

Calling attention to a letter received from Warren F. Eaton, in charge, Hawk and Owl Protection, National Association

of Audubon Societies, Dr. Bishop read the Association's policy on hawk and owl protection and outlined what is being attempted in the way of protective legislation for the persecuted birds, and the intention of the Association to secure, if possible, similar protection for both Bald Eagles and Golden Eagles. Dr. Bishop also made available for interested members a list of the books and the educational leaflets that are for sale to secure funds for furthering the protection campaign.

Mr. Kenneth C. Alexander, connected with the Canadian Game Conservation Bureau, was introduced by Mr. Willett. Mr. Alexander has made an extensive study of charted air currents over land and sea and has applied this knowledge to what is now known of the various routes taken by migrating birds. His theory on bird migration to the effect that air currents form barriers which guide the birds was presented in a very logical way and the discussion that followed his short talk was filled with interest.

Adjourned.—LAURA B. LAW, *Secretary*.

FEBRUARY.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held at 8 p. m., Tuesday, February 26, 1935, at the Los Angeles Museum, Exposition Park, Los Angeles, with President Cowles in the Chair and forty members and guests present. Minutes of the Southern Division for January were read and, with corrections noted, were approved. Minutes of the Northern Division for January were read.

Applications for membership were presented, as follows: Miss Charlotte E. Dancy, Utah Agricultural College, Logan, Utah, by W. Lee Chambers; Mr. Harold Merrill Hill, 329 Summit Avenue, Redlands, California, by Roland Case Ross; and Mr. Leslie Wheeler, Lake Forest, Illinois, by H. B. Conover.

The secretary read an invitation extended by "The Peytons" to the Southern Division to again hold its April meeting at Henley's Camp in Sespe Canyon, and on motion by Dr. Warner, seconded by Mr. Reis, the invitation was accepted and April 28, the fourth Sunday in the month, was chosen as the meeting date. Dr. Miller announced that May 24, 25, and 26 had been selected for the Tenth Annual Meeting of the Cooper Ornithological Club to be held this year at Berkeley.

From a letter written by John H. Baker, executive director, National Association of Audubon Societies, Mr. Willett read a

statement with relation to water fowl hunting regulations in 1935, and said that while members of the Cooper Ornithological Club, as individuals, had written to Washington recommending the protection and conservation of wild water fowl, he thought it might be in order for the Southern Division of the Cooper Club to go on record as sponsoring the recommendations suggested in the statement just read. After an animated discussion which covered many points, the motion was made by Mr. Pemberton that the Southern Division of the Club go on record as favoring a closed season on the shooting of ducks and other wild fowl for the period of one year. This motion was seconded by Dr. Warmer and unanimously carried. A further motion was then made by Mr. Ross, that the president of the Southern Division of the Club communicate to the Advisory Board on Wild Life Protection, at Washington, the temper and mind of this meeting with regard to conservation of wild water fowl and a closed hunting season. After discussion, the motion was seconded by Mr. Willett and unanimously carried.

Some of the field observations reported by members were: A large flock of Brewer Blackbirds seen in Oregon by Dr. Warmer contained a completely white bird, apparently an albino. The question was asked if this was at all common. Mr. Willett replied that partial albinism was not unusual but that a pure albino is rarely seen. Dr. Miller commented on the fact that the White Pelican is commonly considered a bird of the interior and yet he had twice seen one or two at Point Mugu, and that in mid-February he had seen four or five at Bolsa Chica. Mr. Meadows said that a few White Pelicans had been at Bolsa Chica since Christmas. A crested Jay collected at Blythe by Mr. Reis was shown but was not identified subspecifically. Mr. Michener reported the banding in February of an Arizona Hooded Oriole, which rounded out their record for having banded this species every month in the year in their yard at Pasadena. Mr. Richardson reported a nest of Anna Hummer with two young in it, found in Westwood in early February. Dr. Parsons told of having found fledglings in an Anna Hummer's nest, that must have been hatched in January.

Mr. Kenneth C. Alexander, of Vancouver, was again present as a guest, and when called upon by the Chair spoke briefly about some British Columbia birds.

He told of the Glaucous-winged Gull seeming to prefer to nest on the islands where the wild green onions grow; the Western Grebes' preference for fresh water in which to nest; the fine stream-line design of the Green-winged Teal; the swift flight of the Gray Falcon, surpassed only by that of the Hoary Bat; how the Blue Grouse has held its own in spite of hunters. These were only a few of many interesting natural history comments made by Mr. Alexander. In conclusion he referred to the necessity for conservation and protection of our wild life and suggested that perhaps the only way to get nation-conscious in protecting game was to instruct the young in the schools and to keep in touch with youthful organizations such as the Boy Scouts.

Adjourned.—LAURA B. LAW, *Secretary*.

#### NORTHERN DIVISION

JANUARY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, January 24, 1935, at 8:00 p. m., in Room 2003, Life Sciences Building, Berkeley, with President Pickwell in the Chair and about sixty members and guests present. Minutes of the Northern Division for December were read and approved. Minutes of the Stanford Chapter for December were read. Proposals for membership were: Elmer C. Aldrich, 2079 39th Ave., Oakland, Calif., by Gayle B. Pickwell; E. A. Kitchen, 4014 North 35th St., Tacoma, Washington, by J. Grinnell; Finn Theodore Malm, 2924 Deakin St., Berkeley, Calif., by Brighton C. Cain; Ben Clifford Gerwick, Jr., 721 San Luis Road, Berkeley, Calif., by Jean M. Linsdale; and Charles Goodwin Thompson, 587 Arlington Ave., Berkeley, Calif., by S. G. Morley.

The nominating committee appointed at the December meeting to name officers for the Northern Division for 1935 reported through the chairman, Mrs. Amelia S. Allen, the selection of the following: President, Alden H. Miller; Vice-president, Donald D. McLean; Secretary, Hilda W. Grinnell. Mr. Joseph Dixon moved that the report of the nominating committee be accepted and that the secretary be instructed to cast a ballot electing the above-named candidates. The motion was duly seconded, unanimously passed, and the secretary reported the ballot cast.

Mrs. G. E. Kelly suggested that anyone wishing to see shore birds should duplicate the trip which she took on January 21, driving to Palo Alto via Dumbarton

Bridge and returning via San Mateo Bridge. About one-half mile north of Alvarado was an excellent place for observing the birds, literally thousands being in sight, among them Wilson Snipe, killdeer, eared grebes, godwits, yellow-legs, three kinds of sandpipers, three of plover, and dowitchers. Near Dumbarton Bridge thirty-six American Egrets were seen. On her way to Stockton on December 27, Mrs. Kelly saw 250 Little Brown Cranes at King Island.

Mrs. Allen reported that during the third week in January two Band-tailed Pigeons were several times seen in the tops of the oak trees at her home. Mr. Summer Brooks told of seeing two White Pelicans in Wildcat Canyon early in December and of noting a Rhinoceros Auklet at Asilomar in January. Miss Sherman told of seeing a Red-tailed Hawk near her home, with a bird in its claws. On December 19 Mr. Alden Miller visited the camp site near Coalinga where Mr. Grinnell in 1932 found LeConte Thrashers with eggs and young in February. At the time of Mr. Miller's visit these birds were paired, were making courtship displays, and were in full song in the early morning. Miss Wythe announced that the White-throated Sparrow first noted on January 11 on the north side of the Life Sciences Building by Mr. Grinnell had been seen by other observers three times during the third week of January.

Miss Barbara Blanchard was the speaker of the evening and from her studies of the White-crowned Sparrows on the Berkeley Campus she contributed a wealth of interesting material. Beginning her study of the white-crowns early in the spring of 1934, Miss Blanchard quickly realized that there were two differing groups of these birds in her area. One group was of about sixteen pairs, the males of which had definite singing posts. The second category consisted of flocks, each of about twenty individuals; each flock kept for the most part to the higher shrubbery and trees, and none of these birds had definite singing posts. The collection and dissection of a few birds from each group showed that the internal, morphological differences bore out the conclusion already reached from plumage analysis, namely, that the two groups represented different subspecies, resident *nuttalli* and wintering *pugetensis*. Miss Blanchard suggested that in the differentiation of species, differences in behavior may precede morphological differences.

Her talk included an account of the nesting, the rearing of the young, and the territoriality of the resident subspecies.

Adjourned.—HILDA W. GRINNELL, Secretary.

FEBRUARY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, February 28, 1935, at 8:00 p. m. in Room 2003 Life Sciences Building, Berkeley, with President Miller in the Chair and about fifty members and guests present. Minutes of the Northern Division for January were read and approved. Minutes of the Southern Division for January were read in part. Mr. Douglas Lawrence Kraus, 2708 Haste St., Berkeley, Calif., was proposed for membership by Miss Margaret W. Wythe.

President Miller announced that the Tenth Annual Meeting of the Cooper Club will be held in Berkeley from May 24 to May 26, inclusive; also, that the Club's incorporation papers are now filed with the Secretary of State.

Mrs. Allen reported the presence of a Lutescent Warbler at her home on February 28, and that Allen Hummingbirds had been seen in the vicinity for the past week. Mr. Fitch told of hearing the song of a Lutescent Warbler in Strawberry Canyon on February 24. Mrs. Hillebrand found a Song Sparrow nest-building on February 16, and Ted Malm reported that Bush-tits had been constructing a nest in his garden during the past week. Mrs. Kelley told of seeing two flights of Little Brown Cranes near Stockton, one of 250 individuals, the other of 125; of seeing about 300 Egrets on Borden highway near Alameda; and of finding a Clapper Rail in the marsh near there on the morning of February 28. Miss Rinehart compared the feeding habits of a Great Blue Heron and an Egret seen on the northern end of Richardson Bay.

Mr. Clifford Presnall of Zion National Park was a visitor at the meeting and spoke inviting members to visit Zion, Bryce Canyon and Cedar Breaks. He suggested that Zion be visited if possible in May or early June, the other localities later, because of their higher altitudes.

Mr. Donald D. McLean of the California Division of Fish and Game was the evening's speaker; his topic, "The Effects of Civilization upon the Birds of Northeastern California." The speaker's work often takes him into the high volcanic plateaus of Modoc and Lassen counties, in north-



eastern California. There he finds that man's activity has brought about many changes in avian modes of life. Among the numerous instances cited by Mr. McLean were the following: During a period of deep snow he found flocks of Horned Larks aggregating about 15,000 individuals coming in from the snow-covered prairie to seek food and shelter among the tops of the alien Russian thistles which projected above the snow. At this same time birds were following the snow plough for the gravel exposed along roads, their usual source of this necessary material being covered. Each ranch house has its flock of English Sparrows about the barns and these birds fall easy prey to the Northern Shrikes. Reclamation projects on the upper Pit River, at Honey Lake and at Eagle Lake have obliterated marshes where ducks and geese nested formerly. Canada Geese have taken advantage of the safe nesting sites offered by stacks of alfalfa hay and there hatch their young above the reach of predators. All through the region sheep grazing has damaged nesting sites of Sage Hens, Sharp-tailed Grouse, Horned Larks and Western Meadowlarks, and many eggs are crushed by being stepped on. Sharp-tailed Grouse, supposed to be extinct in California, have been reported in small numbers either "re-discovered" or as re-invading Modoc County from outside the state. An Arctic Horned Lark secured by Mr. McLean brings the list of birds recorded from California up to a total of 609.

Adjourned.—HILDA W. GRINNELL, *Secretary*.

#### STANFORD CHAPTER

FEBRUARY.—The monthly meeting of the Stanford Chapter of the Cooper Ornithological Club was called to order by President Willis H. Rich on the evening of February 7. The minutes of the previous meeting were accepted as read. The receipt of a letter from Mr. W. I. Follett, Chairman of the Conservation Committee of the Northern Division, was acknowledged by President Rich, who asked if the committee on the Bay Shore Refuge, consisting of Dr. Isabel McCracken, Mr. John Price, and Mrs. Sadie G. Hackley, had anything to report. The committee announced that matters were at present at a standstill. Dr. Rich urged that the committee set to work to clear up the matter before the time of the next meeting, in order that a complete case may be presented at an early date to the State Fish and Game

Commission and to the Board of Directors of the Cooper Club.

The secretary reminded members of the local dues of twenty-five cents payable at the next meeting, which are necessary for the printing and mailing of announcement cards.

In the field of literature, Dr. Rich mentioned the availability of Grinnell's new "Life-zone Map of California," published by the University of California Press. Mr. Lastreto called attention to a publication by Milton S. Ray on the Farallon Islands; he elaborated on the contents of this book, adding that it was a worthwhile addition to the library of anyone interested in California history or in birds. He protested the elimination of the mention of work done by a committee, of which he and the late Dr. Barton W. Evermann were members, on the prevention of waste oil dumping at sea in the vicinity of the Farallon rookeries. A discussion arose upon this serious problem, which evidently still exists according to Dr. Pickwell.

The only field observation reported was made by Dr. Rich, who said that he had noticed some Golden-crowned Sparrows in his garden at home, and that he hoped to trap them in order to identify them.

President Rich then introduced the speaker for the evening, Dr. Gayle B. Pickwell of the San Jose State Teachers College, who spoke on "The Arctic Birds of Mt. Rainier." Dr. Pickwell declared that his principal interest in ornithology has always been in "marginal" birds, that is, birds which occur in a marginal position between conditions which will support bird-life and those which will not. This, primarily, led him to a study of those birds which live above timber-line in the Arctic zone as it occurs on Mt. Rainier in the State of Washington. The bird population in this zone includes the Hepburn Rosy Finch, the Pallid Horned Lark, the American Pipit, and the White-tailed Ptarmigan. As a peculiarity of the rapid changing of seasons at this life level, the lengthy breeding season and season of song as it occurs in most birds at lower levels is here reduced to a period of about three weeks. Illustrating his lecture with a selection of tinted slides, Dr. Pickwell discussed the interesting facts brought to his mind by the various pictures; these included some rare views of nesting pipits and ptarmigan coveys together with illustrations of the arctic flora.

Adjourned.—WILBUR V. HENRY, *Secretary*.



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